

Geol

Rock Products

with which is incorporated

CEMENT *and* ENGINEERING NEWS

Founded 1896



Cultivation of Goodwill

- The Chairman of the Public Relations Committee of The Cement Institute, B. F. Affleck, says: "When buyers and the public in general misunderstand the cement industry, it handicaps the promotion of concrete and increases sales resistance."
- The same is true to a greater or less degree in the case of all construction materials industries at the present time; it is true to some degree in the case of all industry.
- This misunderstanding is the product of many causes. In the case of the cement industry, and to less extent the aggregates industry, misunderstanding and popular ill-will are the direct result of their having to deal with political units of government, controlled by politicians.
- What the public pays for always makes political capital, and therefore news; that recent price increases are the indirect result of NRA codes can not be disputed; hence newspapers hostile to NRA and the New Deal love to use such news.
- The newspapers, probably in most cases, do this thoughtlessly without much consideration to the damage it does large groups of the public they, in nearly every case, are genuinely anxious to serve.
- However, since both politicians and newspapers are wholly dependent on the goodwill of the public, it should not be an impossible task to change their attitude toward any industry that is honestly and conscientiously serving the public.
- Sincerity of that public service is the real criterion; it is difficult to see how a manufacturer can abhor the NRA and all that goes with it and in the same breath use it to justify price increases, uniformity of price quotations, etc.
- Cultivation of goodwill, as every publisher knows, is a matter of years of faithful service to that ideal; it can not be gained in weeks or months by mere expenditure of money for publicity—although the right kind of publicity is of vital importance.
- Goodwill is the summation of a great many small services, inconsequential in themselves; the cultivation of goodwill properly begins in one's own organization, with officers, employees, stockholders, dealers, customers.
- The goodwill of an industry is the summation of the goodwill of the various members of the industry; one black sheep can do much to destroy the goodwill all the other members of the flock acquire as individuals for the industry.
- It is time the cement industry, and every industry, started cultivation of goodwill on such grounds. It is part of the NRA, or New Deal program, whether one likes to admit it as such or not.

—The Editor

Member A. B. C.
(Audit-Bureau of Circulations)
Member A. B. P.
(Associated Business Papers)

JUNE

1934

The Oldest Publication
In Its Field and the
Recognized Authority



LET'S PUT IT UP TO ROEBLING
...they can make wire do most anything but talk

FOR over 90 years Roebling has specialized in the making of wire... and wire products. Famed for its exceptional strength, toughness and stamina, Roebling Open-hearth Steel Wire is used for countless severe services...ranging from the great main cables of San Francisco's new Golden Gate Bridge to the tiny but tremendously strong control cables of giant air transports.

It is this unequalled experience in the making of wire...the backbone of wire screen...plus over half a century of experience in wire screen manufacture...which enables Roebling:

- (1) *To furnish outstanding cooperation to the Rock Product industries in meeting screening requirements.*
- (2) *To make wire screens which because of their high efficiency, and high resis-*

tance to vibration and abrasion, spell low screening cost.

Consult Roebling regarding your wire screen needs. Take advantage of Roebling's broad experience and unusual wire screen making facilities. We would welcome your inquiry and an opportunity to cooperate with you.

JOHN A. ROEBLING'S SONS COMPANY
 TRENTON, N. J. Branches in Principal Cities

ROEBLING *Wire Screen*

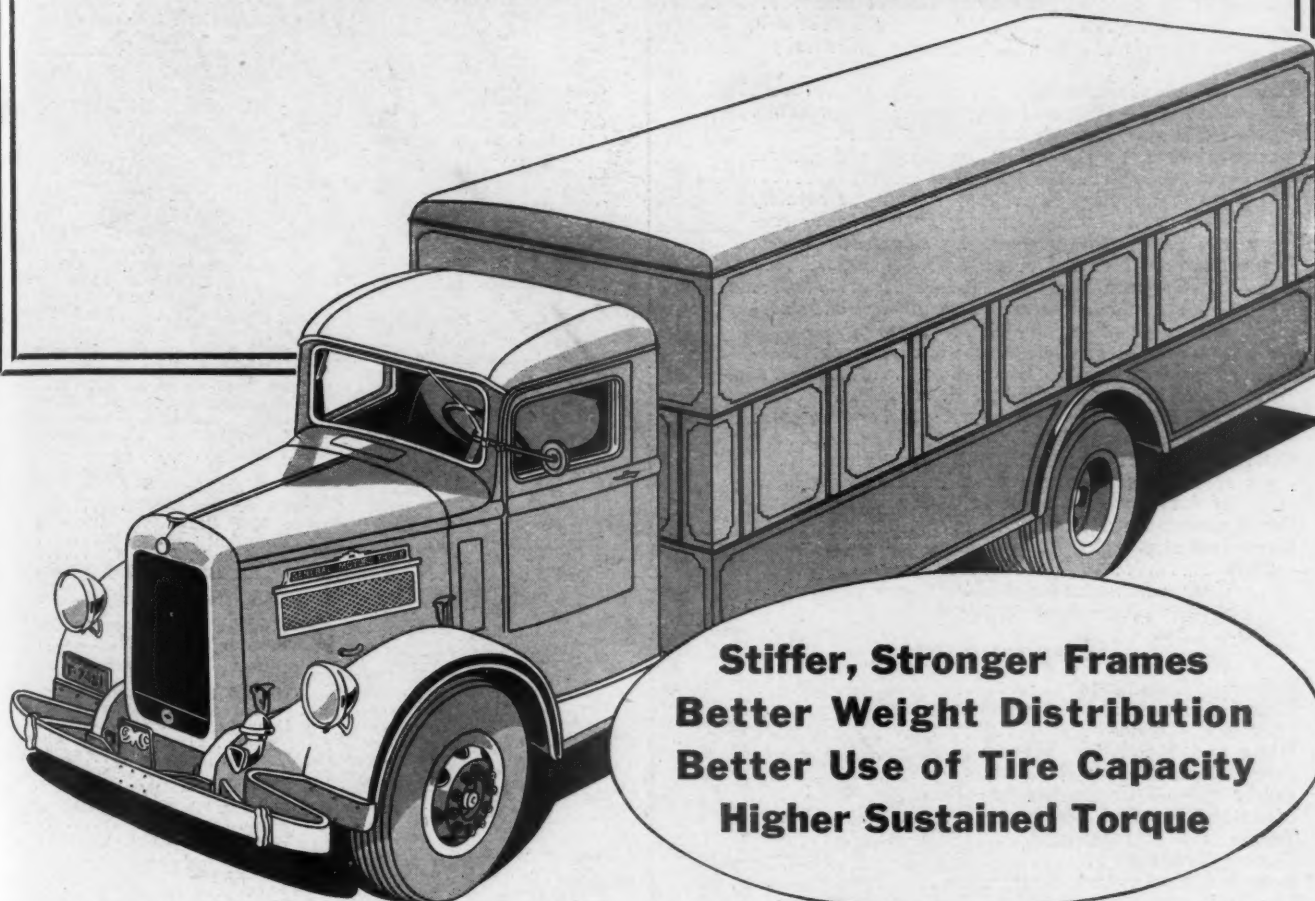


ROEBLING — MAKERS OF WOVEN WIRE FABRICS FOR OVER HALF A CENTURY

When writing advertisers, please mention ROCK PRODUCTS

GMC HEAVY DUTY TRUCKS

**GIVE YOU MORE CAPACITY
AND MORE PERFORMANCE**



**Stiffer, Stronger Frames
Better Weight Distribution
Better Use of Tire Capacity
Higher Sustained Torque**

The most important question to ask yourself, when about to buy a truck, is—"Has it the capacity and performance to do my job *right*?"

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Time Payments Available Through Our Own Y. M. A. C.

PONTIAC, MICHIGAN

Recognized the World Over as the Leader in Its Field

Rock Products

With which is
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(Issued Monthly)

June, 1934

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Telephone
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TO SUBSCRIBERS—Date on wrapper indicates issue with which your subscription expires. In writing, to have address changed, give old as well as new address

INTERNAL
FRICTION
"This job is
hopeless"

WATER
"Can't get a
drop in"

THESE IMPS

are wasting their time

● Macwhyte wire rope—including
the famous Monarch Whyte Strand
—is protected from destructive
wear and tear by a special kind of

INTERNAL
LUBRICATION

HEAT
"Ugh, can't melt it"

COLD
"I give up"

INTERNAL
CORROSION "I'm licked"

"Come on boys,
it's no use"

Adv. No. 124

A heavy viscous coating of lubricant is applied to each wire in the strand by Macwhyte. It resists heat. Cold does not cake it. Water and ordinary acids do not hurt it. This lasting internal lubrication plus unusual toughness of wire plus superior Macwhyte workmanship accounts for the service records made everywhere by Macwhyte Wire Rope.

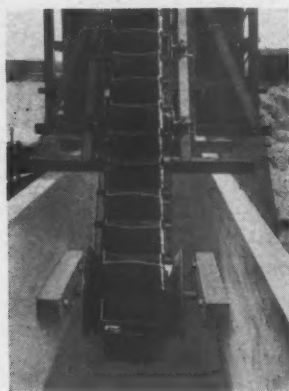
MACWHYTE COMPANY, Kenosha, Wisconsin

**MACWHYTE
WIRE ROPE**
internally lubricated

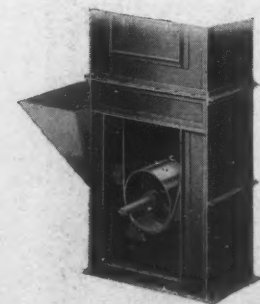
Monarch Whyte Strand gives high performance records
Especially in Preformed Construction

ELEVATING

Link-Belt makes all types of bucket elevators adaptable to the work of raising materials at gravel and stone plants. These include continuous bucket, centrifugal discharge, and digging elevators, for every capacity and condition.



We manufacture in our own shops (and carry stocks at convenient points), all the elements entering into the bucket elevator, such as chains and buckets of malleable, Promal and steel; gears, sprockets, traction wheels, take-ups, casings, boots, etc.

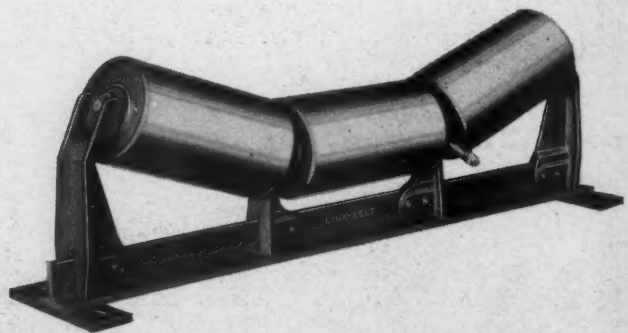


CONVEYING



Dependability and low maintenance costs can be assured by the use of Link-Belt conveyors, of the belt, apron, flight, screw, and other types.

The Link-Belt line of belt conveyor equipment includes a type and size of anti-friction bearing idler and return roll for every capacity and service condition. Also, a complete line of trippers, and all accessories. Send for Belt Conveyor Data Book No. 1615.



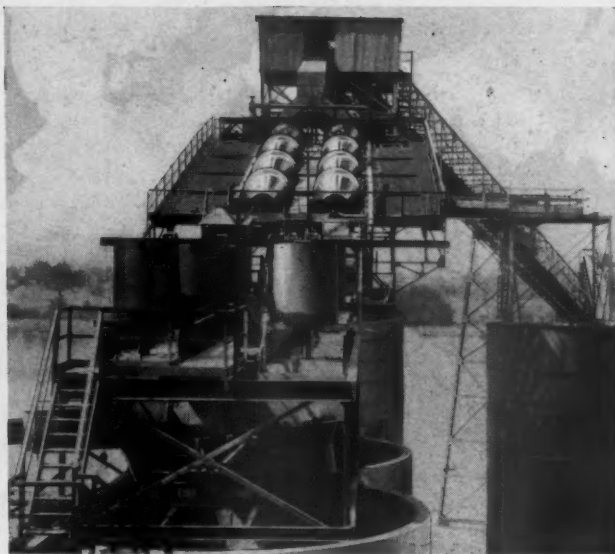
WASHING



For washing, scrubbing, and dewatering, Link-Belt makes a variety of units for any size of plant, character of deposit, or market condition. Send for Book No. 1240.

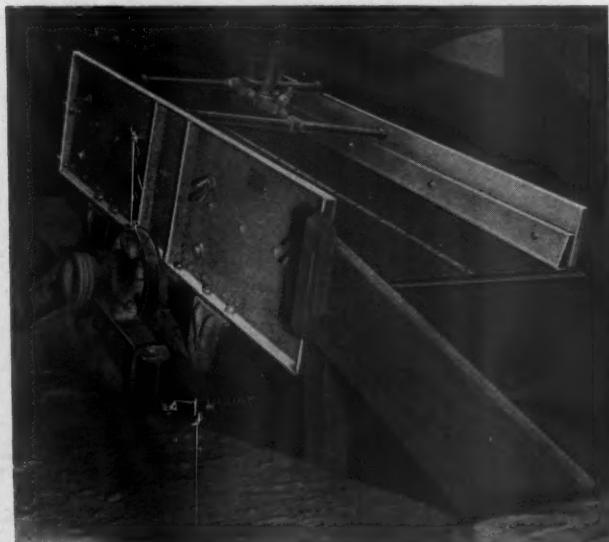


CLASSIFYING



Dull inclined conical screens have won foremost rank in sand and gravel screening equipment.

The Link-Belt Vibrating Screen has also attained unusual success in the industry. It is made in three general types, for coarse or fine screening. We also make screens of the cylindrical, trunnion, disc-grizzly and other types.



4942

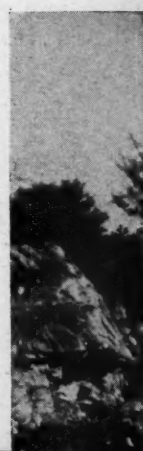
LINK-BELT COMPANY, Chicago Philadelphia Indianapolis San Francisco Toronto Offices in all Principal cities

by LINK-BELT

Where Balanced Value is doubly appreciated

When you are up against digging like this you want a shovel as sturdy and staunch as they build them. It's no place for a weakling nor even for a good piece of machinery that has a weak spot here and there! It calls for a shovel with the "intestinal fortitude" to tie into the job and lick it. Yes, and come out ready to tackle another one like it. On jobs like this, balanced value is doubly appreciated.

Sooner or later your machine will probably have to meet this kind of a test. That's why you should select a Bucyrus-Erie next time you buy an excavator.



723A



See **BUCYRUS-ERIE** before you buy!

BUCYRUS-ERIE CO., South Milwaukee, Wis.

TRAYLOR

BULLDOG GYRATORY

*Used as a Primary
Breaker in Many
Leading Plants*



Photo shows 60" machine, thirty feet high, weighing one million pounds.

Get in touch with our nearest office today. Ask for full details regarding your requirements. Each TRAYLOR representative is glad to offer the fullest cooperation in helping solve your individual problem efficiently and economically.

Don't forget to ask about the TRAYLOR Patented Non-Chokable Bell Heads and Concaves. Built into our new crushers and supplied to rebuild old crushers of any make.

This is one of the many popular products of the very extensive TRAYLOR line of rock products equipment. This tremendously rugged crusher is available in 7 SIZES from 30" to 72" —to meet any primary crushing requirement. Any size selected can be fitted with the NEW TRAYLOR Original Patented Non-Choking Bell Heads and Concaves, assuring fine product in large quantities.

The Traylor Bulldog Gyratory has bar type SPIDER that does not weave and it is practically an integral part of the Top Shell. This practically does away with the danger of breaking the shaft. Such additional features as a SUSPENSION which eliminates stripping of shaft threads; an absolute dust seal; positive and automatic force feed lubrication system, etc., make the Bulldog highly desirable in any crushing operation where maximum results are to be obtained at lowest operating costs.

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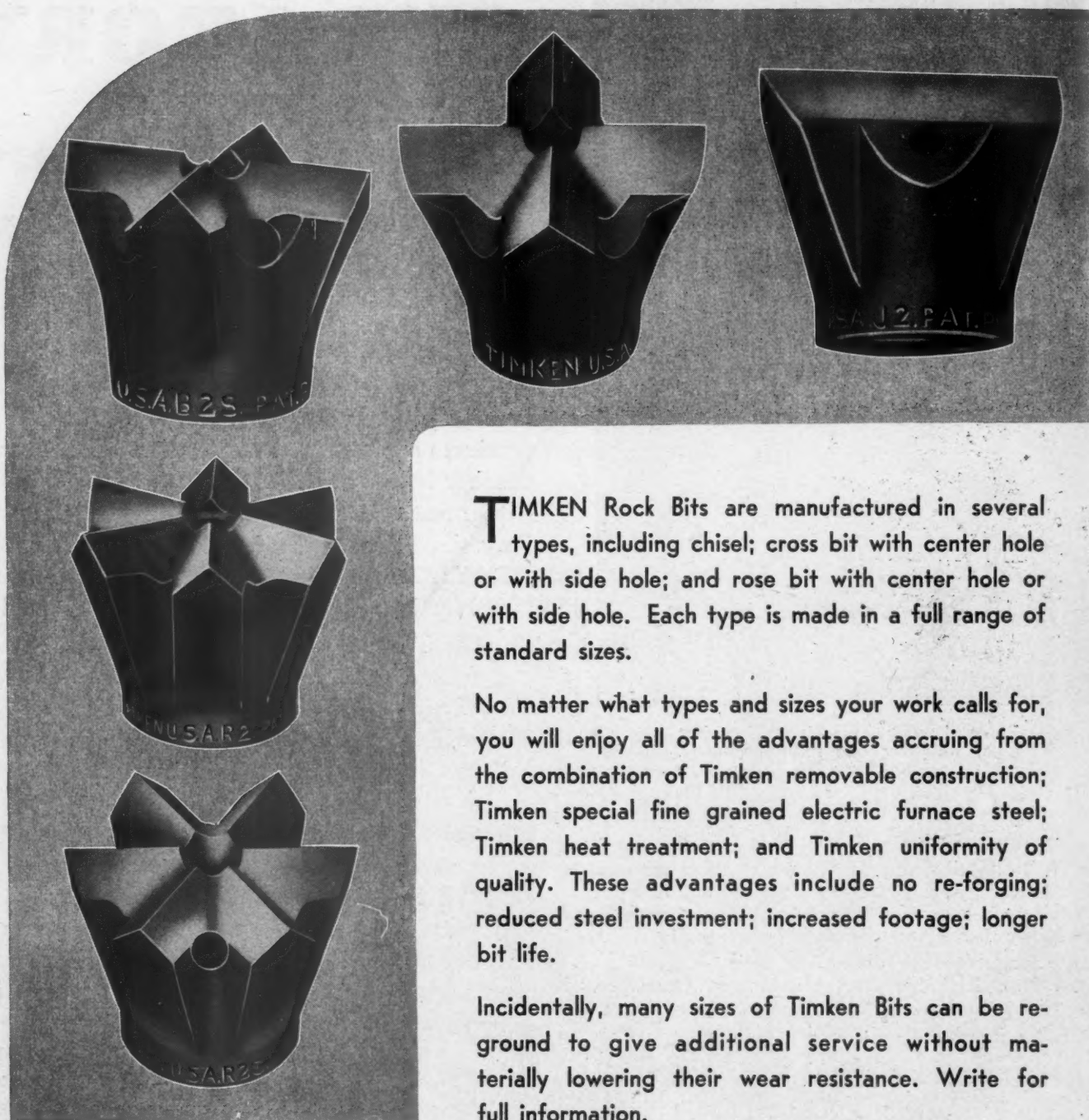
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A Bit for Every Type of Rock and Every Drilling Condition



TIMKEN Rock Bits are manufactured in several types, including chisel; cross bit with center hole or with side hole; and rose bit with center hole or with side hole. Each type is made in a full range of standard sizes.

No matter what types and sizes your work calls for, you will enjoy all of the advantages accruing from the combination of Timken removable construction; Timken special fine grained electric furnace steel; Timken heat treatment; and Timken uniformity of quality. These advantages include no re-forging; reduced steel investment; increased footage; longer bit life.

Incidentally, many sizes of Timken Bits can be re-ground to give additional service without materially lowering their wear resistance. Write for full information.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN BITS

A ROUGH PROBLEM SOLVED



CONQUERED 8800 FEET OF MEAN "UP AND DOWN" COUNTRY

THE illustration shows an example of moving material at a very low cost per ton mile by the use of an American Steel & Wire Company designed, manufactured and completely erected Aerial Tramway. This job is moving 100 tons per hour over nearly a mile and three-quarters of bad terrain. Capacity can be increased to 175 tons hourly by just adding rolling stock. The buckets turn a horizontal angle of 29 degrees automatically, as well as being automatically loaded and discharged. Only one operator is required. Whatever and wherever your transportation problem we will be glad to study it with you.

1831



1934

AMERICAN STEEL & WIRE COMPANY

208 South La Salle Street, Chicago
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AND ALL PRINCIPAL CITIES

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WHY NOT GET THE LATEST "DOPE" ON GRAVEL PLANTS

?



Do you know what the makers of gravel plant machinery have been doing lately . . . what new equipment they have built . . . how this modern equipment has influenced plant layout and production? Such information is worth having . . . whether you are or are not planning to increase capacity or build a new plant. Here are two bulletins that will give you all the "dope."

During the past two years Tel Smith engineers have done a lot of research. Engineering facilities have been expanded, too. The result—much new equipment . . . crushers, vibrators, log washers, sand tanks, etc. . . . each piece designed and built to improve the product and cut operating costs.

Why Tel Smith engineered plants require fewer mechanical units; illustrations of the units; other interesting, easy-to-read facts are all in the bulletins. Ask for G-11 (Plant Equipment) and No. GB-11 (Plant Layouts), no cost, no obligation.

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TEL SMITH

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Milburn Mach'y Co., Columbus, O.



When the Lip's Worn— Renew It!

They are *easily* and *quickly* renewed on AMSCO Renewable Lip All-Manganese Steel Dippers. There are no rivets to punch out. Just loosen two U-bolts and knock out four keys. It only takes a few minutes.

AMSCO Renewable Lip Dippers increase yardage and reduce digging time because they dig faster and load fuller. They are lighter, stronger, cheaper to maintain, last longer and show real savings over old style dippers.

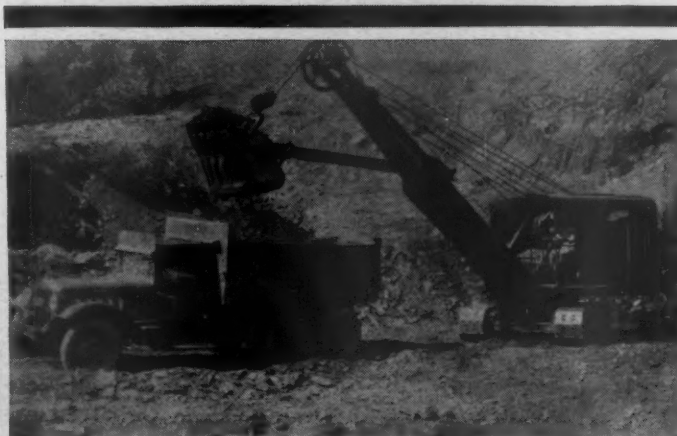
Over three hundred installations on every type of work *proves* the AMSCO Renewable Lip Dipper to be vastly superior.

Don't waste time and money repairing old dippers—put a new AMSCO All-Manganese Steel Dipper on the stick and *note the difference!*

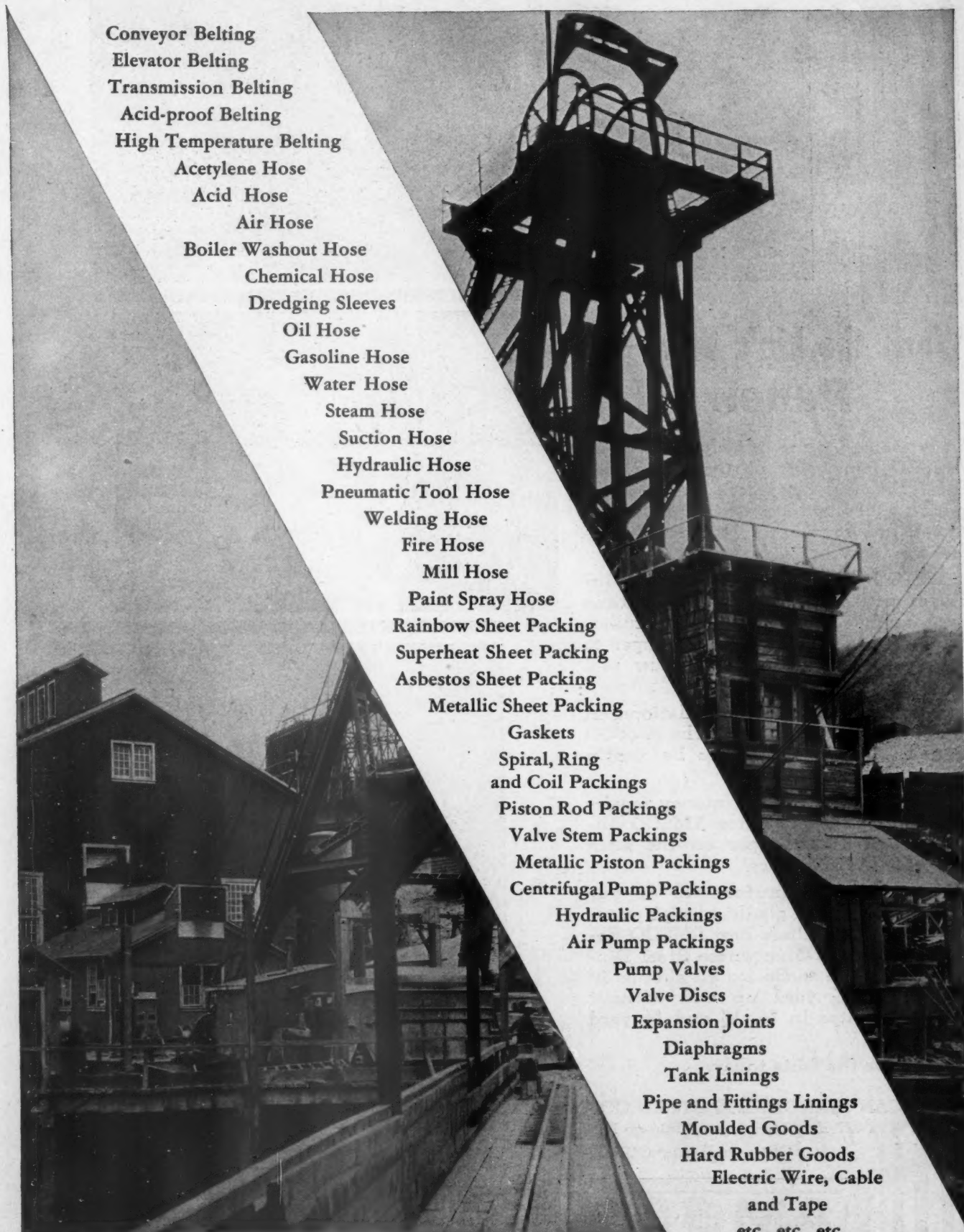
Your shovel manufacturer or our nearest office will gladly furnish complete details on these new AMSCO Renewable Lip All-Manganese Steel Dippers which are made for all shovels in sizes from $\frac{3}{4}$ yard up and without changeable lips in $\frac{3}{8}$, $\frac{1}{2}$ and $\frac{5}{8}$ yard sizes.

Write for the facts today.

AMERICAN MANGANESE STEEL COMPANY
377 East 14th Street, Chicago Heights, Ill.
Offices in Principal Cities



The **PART** *that* **U. S.**



Conveyor Belting
Elevator Belting
Transmission Belting
Acid-proof Belting
High Temperature Belting
Acetylene Hose
Acid Hose
Air Hose
Boiler Washout Hose
Chemical Hose
Dredging Sleeves
Oil Hose
Gasoline Hose
Water Hose
Steam Hose
Suction Hose
Hydraulic Hose
Pneumatic Tool Hose
Welding Hose
Fire Hose
Mill Hose
Paint Spray Hose
Rainbow Sheet Packing
Superheat Sheet Packing
Asbestos Sheet Packing
Metallic Sheet Packing
Gaskets
Spiral, Ring
and Coil Packings
Piston Rod Packings
Valve Stem Packings
Metallic Piston Packings
Centrifugal Pump Packings
Hydraulic Packings
Air Pump Packings
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Electric Wire, Cable
and Tape
etc., etc., etc.

RUBBER *plays in* MODERN MINING



WITHOUT MINES there could be no rubber—without rubber there could be no modern mines.

Rubber is an essential tool of the miners—wherever you turn, in mine or mill, you see it in one form or another.

The mining engineer recognizes the indispensable part rubber plays in his work. He can appreciate the great obstacles the rubber industry has surmounted to provide him with these tools.

As the world's largest producer of mechanical rubber goods, making the most complete line of industrial rubber



The U. S. Rubber Company is the world's largest producer of mechanical rubber goods... makes the most complete line... maintains the greatest research laboratories... and offers to industry a technical engineering service of the broadest experience.

products, "U.S." has indelibly written unsurpassed achievement into the annals of mining.

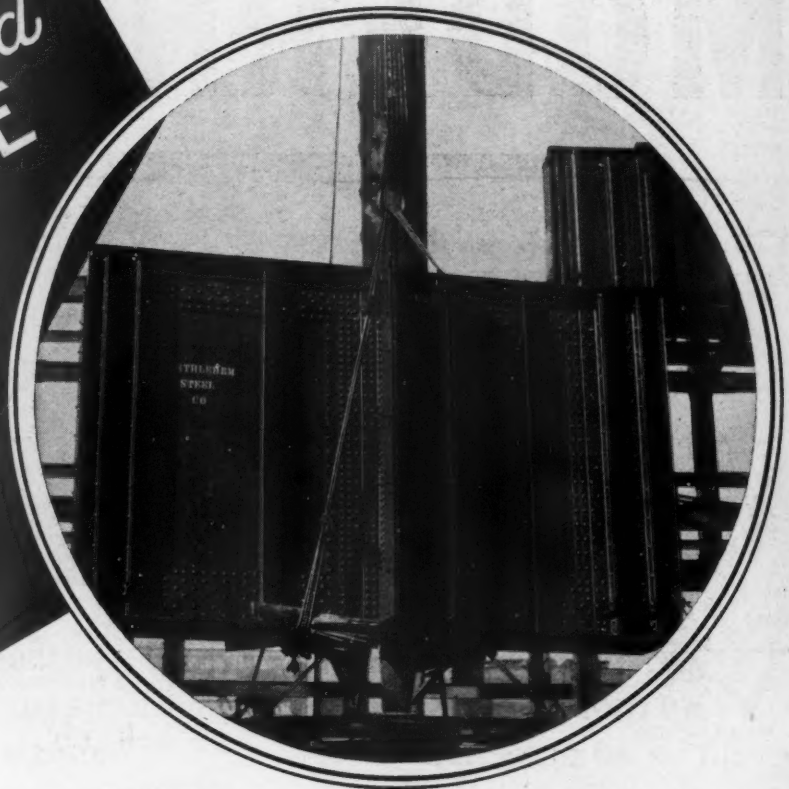
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On any problem involving the use of industrial rubber equipment call on "U.S."

United States Rubber Company

1790 BROADWAY, NEW YORK CITY

BRANCHES IN ALL INDUSTRIAL CENTERS



Williamsport Wire Rope

The increasing demand for specialized wire ropes has been ably met by Williamsport thru a vast amount of research, laboratory experiments and thru actual service tests.

Williamsport now offers a new improved heavy duty drag line cable—a perfected, equalized (pre-stretched) super traction elevator cable—an exceptional shovel rope and improved ropes for hoisting purposes, particularly for heavy work.

All these specialized ropes highly commend themselves to operators who have found but partially satisfactory service in the usual ropes offered for these purposes.

Write us for assistance in the solution of your wire rope problems.

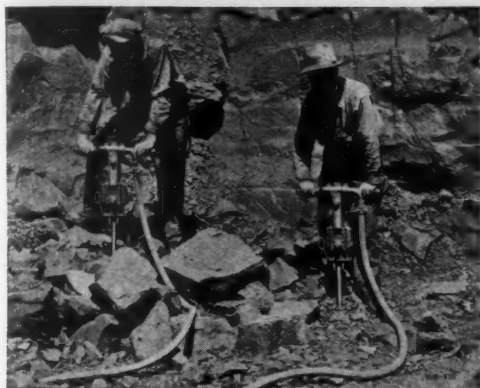
Let us quote you on your next requirements.

Williamsport Wire Rope Company

Main Office and Works: Williamsport, Pa.

Branch Sales Offices: 122 South Michigan Avenue, Chicago

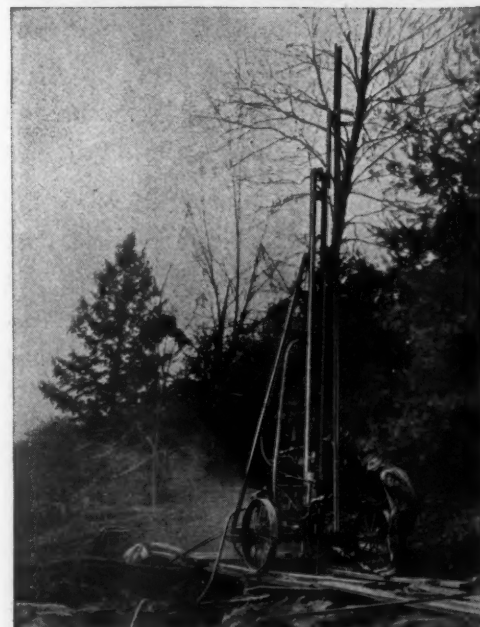
From boulder popping



Two Worthington Rock Hammers,
popping boulders



Worthington Drifter,
snake holing



Worthington Wagon Drill
on deep ledge work

through
shallow ledge work
to
snake holing
and
deep hole wagon drilling

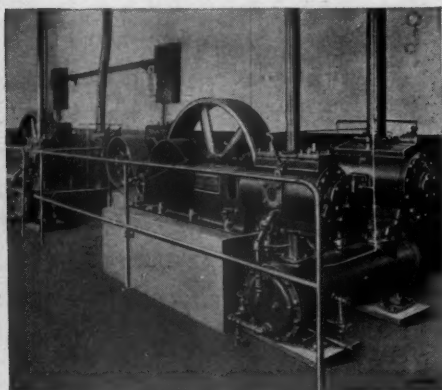
*... there's a Worthington
Rock Drill which will do the
job—better•quicker•cheaper*

WHETHER you need a rock drill . . . a
compressor to supply the air . . . or a
Diesel engine to drive your crushing plant
. . . ask the nearest Worthington office to
send a representative to give you complete in-
formation and competent recommendations.

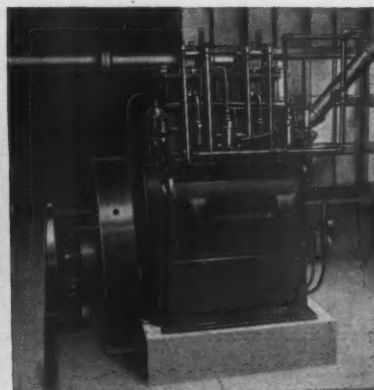
WORTHINGTON PUMP AND MACHINERY CORPORATION

GENERAL OFFICES: HARRISON, NEW JERSEY

Branch Offices or Representatives in Principal Cities throughout the World



Worthington Duplex Compressors
... a reliable, economical air supply

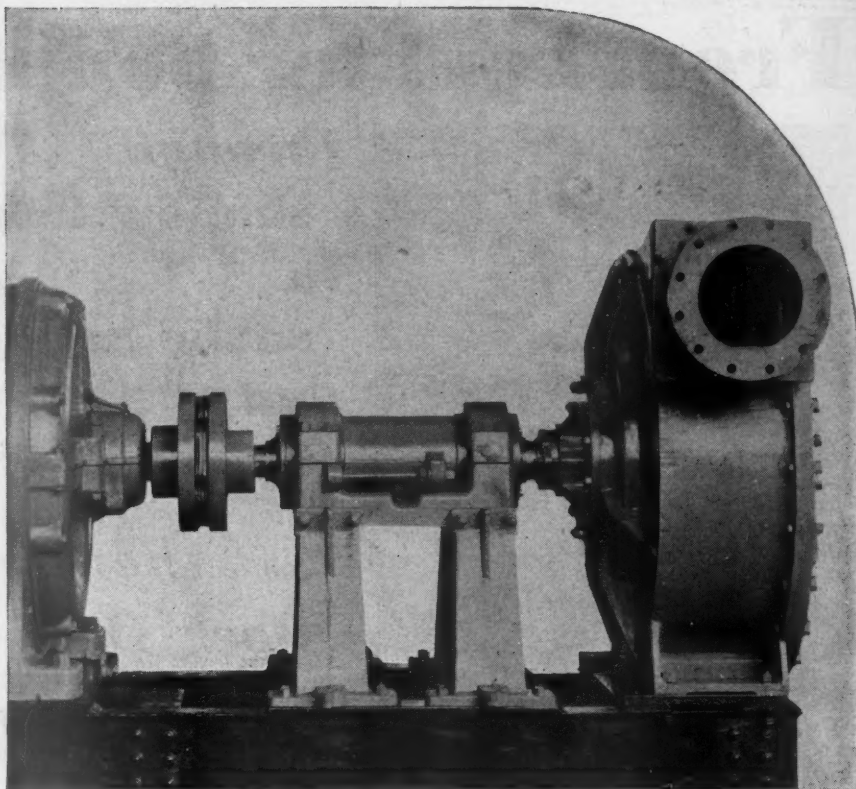


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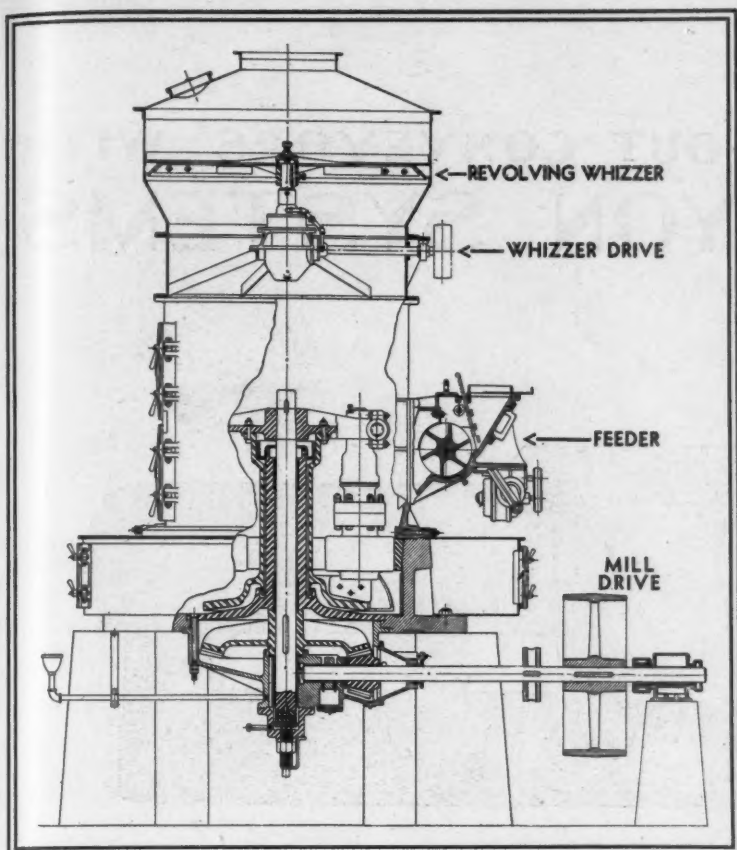
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NEW FINENESS CONTROL

WHIZZER-EQUIPPED ROLLER MILL



*Wide range of fineness
Instantaneous control
Larger mill output
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Uniformity in separation
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THE patented whizzer—so successfully used in Raymond Mechanical Air Separators—is now applied to Raymond Roller Mills. Result—a new degree of flexibility in fineness control.

The whizzer revolves in the air drum above the mill, and is driven by a separate motor through a variable transmission. By simply moving a hand lever, you can vary the speed of the whizzer blades, and so regulate the classification of the finished product as desired—no vanes to set, no adjustments to make.

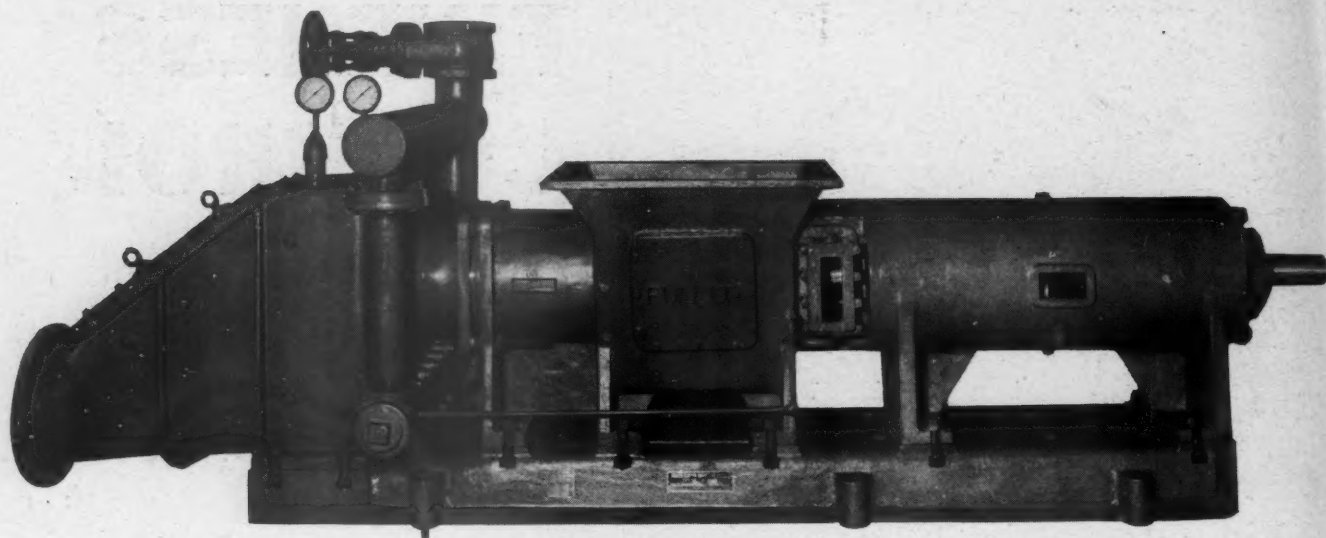
This gives a wide range of fineness, instantly available, from about 80% through 100-mesh to 99.5% passing 325-mesh or better. It is an efficient method of pulverizing various products into several grades, as required in custom-grinding plants.

Write for further details, as this new development may be applicable to your product—with the economy of *one mill for all* your operations. RAYMOND BROS. IMPACT PULVERIZER CO., Main Office and Works: 1307 North Branch Street, Chicago. Sales Offices in New York and Los Angeles.

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The new TYPE "H" Fuller-Kinyon Pump

The heavy cement shipping months are almost here. The news and trade papers are full of articles about the ripening projects for roads, bridges, new buildings and many other undertakings requiring cement. The plants that are equipped to produce this cement quickly and without broken delivery promises will ship most of it—AND the plants that have up-to-date materials handling equipment and other cost-saving facilities now available will make most of the money on these shipments.

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This new bulletin fully illustrates the many uses of Fuller-Kinyon Systems in cement and other grinding mills. We believe it will suggest new short-cuts to greater economy in handling pulverized materials.

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"'ED' THERE'S AN ENGINE
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it has more power than you will ordinarily find operating a shovel
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conditions . . . and holds its speed at those heavier pulls."

"Another thing, 'Red,' . . . in spite of its size, . . . don't you find
it just as economical?"

"Yes, I do, 'Ed' . . . guess that is because of its simple design."
"And Rigid mounting, 'Red,' that eliminates vibration."

● To insure ample reserve power to meet all material handling requirements,
MARION CLUTCH TYPE EXCAVATORS are equipped with over-sized power
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pull . . . more constant operation. Clean and simple design . . . enlarged
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Type 351	1 1/2 cu. yd.
Type 361	1 3/4 cu. yd.
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Type 471	1 1/2 cu. yd.
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Gas-Electric " Diesel-Electric
Shovel " Clamshell " Dragline " Crane " Trench Shovel

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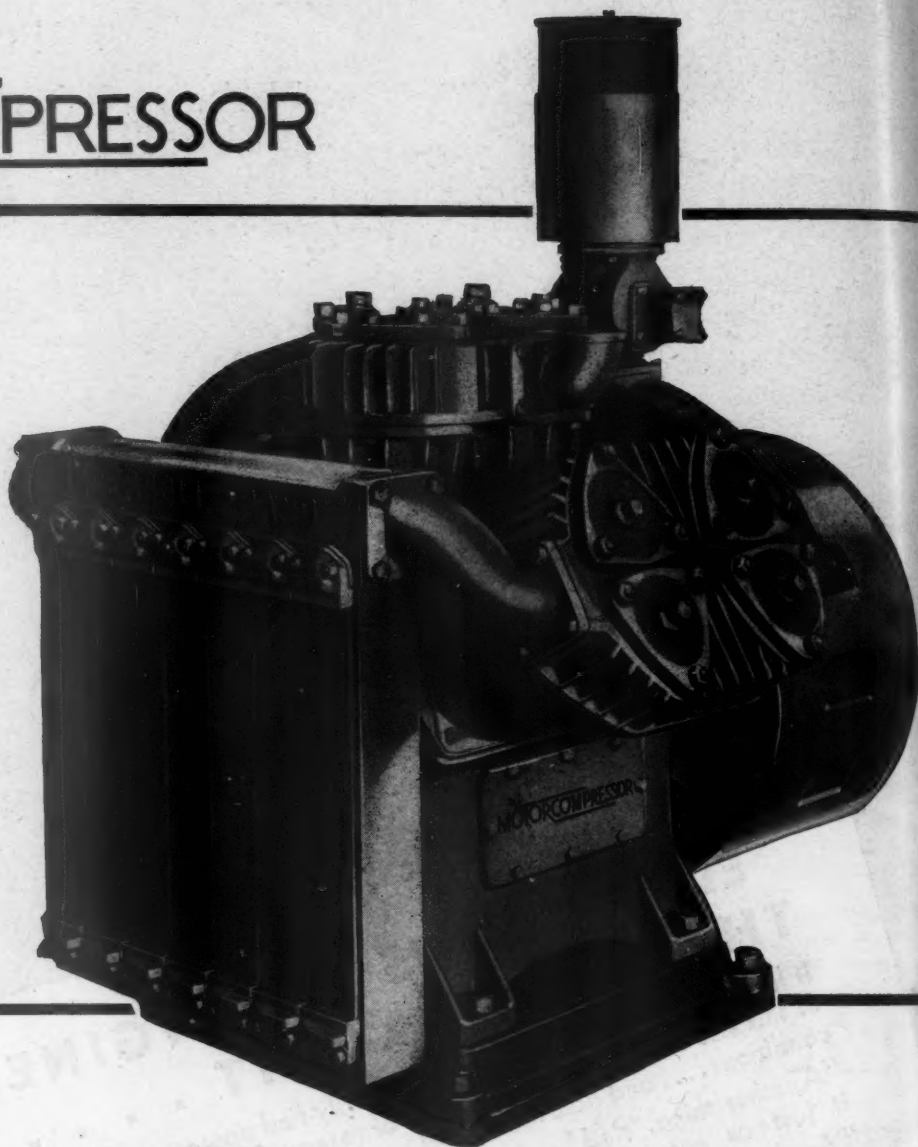
Type 380	2 cu. yd.
Type 390	2 1/2 cu. yd.
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Type 4120	3 cu. yd.
Type 4160	4 cu. yd.

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1,200,000 cubic yards of excavation and Goodfellow Brothers use Tru-Lay

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Preforming removes the tendency to high strand or low strand, kinking, bird-caging and other faults. Tru-Lay Preformed Rope is easier to splice. It handles better and requires no seizing. All of these things mean money to the contractor.

Let us explain to you fully, the longer life and many great advantages of Tru-Lay Preformed Wire Rope. Send for literature or ask our representative to call.



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It's a treat to any man who knows shovels to see one of the new P&H machines at work. We'll be glad to show you one.

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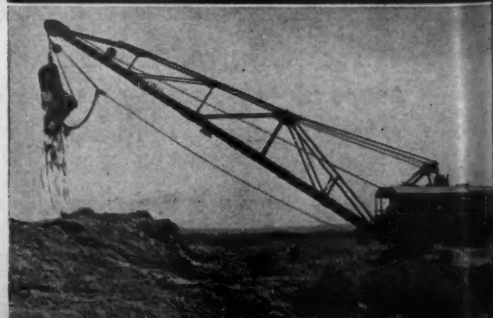
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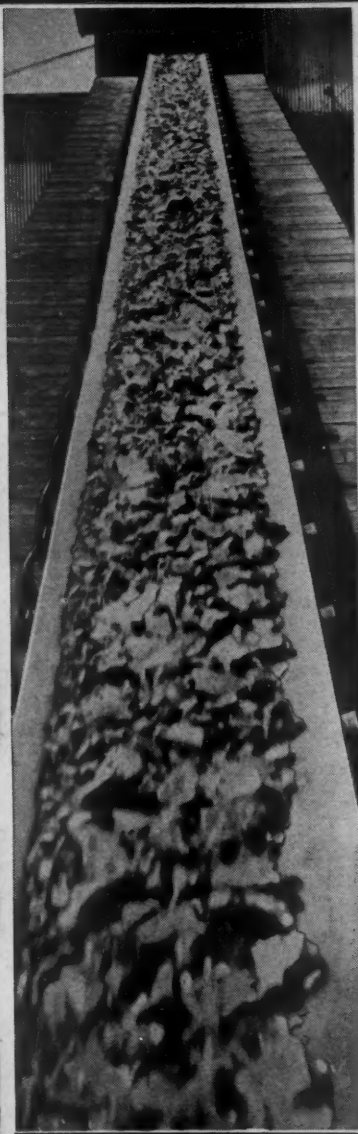
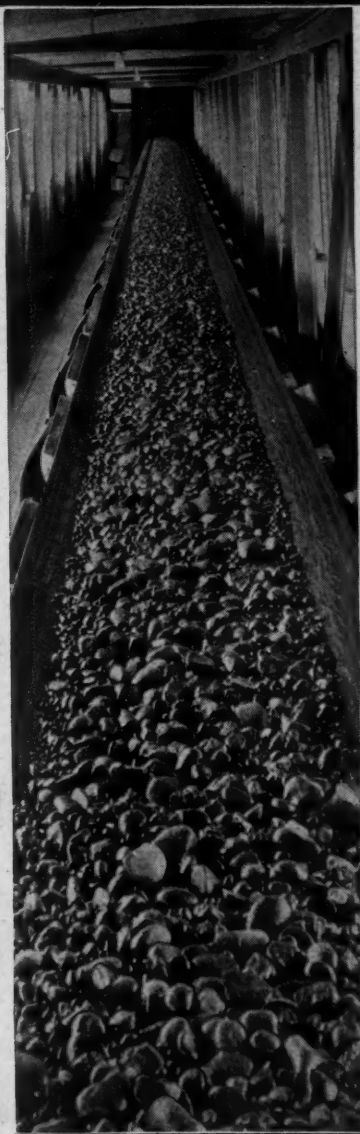
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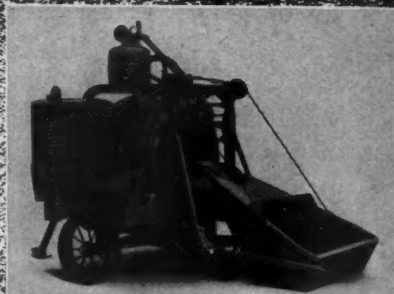
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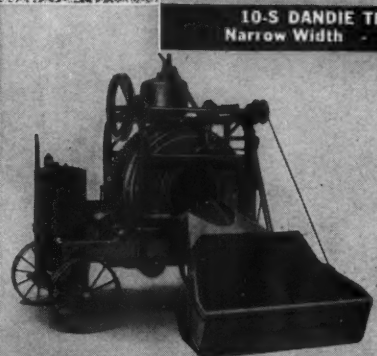
KOEHRING 701 SHOVEL
Hydraulically Cushioned Clutch



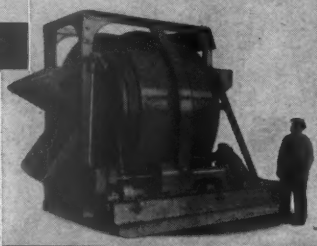
10-S DANDIE TRAIL-MIX
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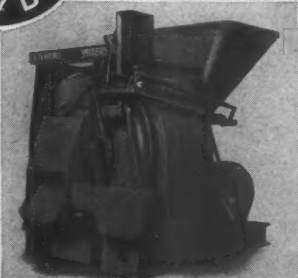
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Division of National Equipment Corporation

WISCONSIN

Rock Products

With which is
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CEMENT *and* ENGINEERING
NEWS

Founded
1896

Volume XXXVII

Chicago, June, 1934

Number 6

Recovery Progress—Trends

IT BECOMES more and more obvious from day to day that the New Deal, and consequently the entire recovery program, is being made a political rather than an economic issue. This is unfortunate because almost all business men, in their saner moments, admit that much good has been accomplished, and much more good *could* follow. Both possibilities for good are likely to be lost sight of in the growing storm of criticism—criticism of details rather than fundamentals, although many critics insist that the very fundamentals of our constitutional government are in danger.

There has been an appreciable slowing up of recovery progress in many lines of business in the last 30 to 60 days. It is difficult to tell whether or not some of this is deliberate, in order to strengthen opposition to pending labor cuddling and stock market control bills now before congress. It is regrettable that such issues cannot be definitely decided on their merits, dispassionately, in the interest of the public welfare; but as long as issues are raised and pushed by politicians for politically selfish purposes, business certainly is justified in fighting back with every resource at its command, although the inevitable result is to lose sight of the really fundamental issue of whether we are on the right track to regain prosperity, which is in the interests of every one not on the government payroll.

Price Problem Uppermost

It is said NRA officials are beginning to realize that "open price policies" can,

and in some instance do, work both ways. Publishing prices in some industries has led to price-cutting instead of price-raising. It is claimed, in newspapers not friendly to NRA, that these same officials expect and hope, privately, that the price provisions of codes will break down. In some consumer goods industries, particularly, it seems that price increases have caused a decided reaction in the volume of business previously done and in that anticipated. Of course, the same law of action and reaction applies to capital

goods industries, but the reaction is slower. The industry, and the individual business, which can accurately adjust price to maximum demand (or to a condition of maximum profit, if this is different from maximum demand) is rare indeed—but, that is something that we all need education and experience in; it is the all important part of planned economy. We are not going to arrive at it in a matter of weeks or months; so we should be patient.

The plan of arbitrarily fixing a bottom price level, as has been done in the automobile tire industry, will be extended, it is said, to other industries where the open-price plan results in destructive price cutting. Industries with a virtually stationary consumer demand are regarded by NRA officials as peculiarly fitted for this "emergency" type of price control. In the case of the tire industry, studies reveal that total sales did not fluctuate widely over a long period. The price wars which occurred were primarily waged between units of the industry struggling for dominant control of the constant demand available. Thus, the cut-throat price slashes did not result in industrial expansion into new markets, but rather weakened the individual units of the industry. Extension of the plan into a general policy for application in future codes has been predicated to a large degree upon its success as a means of checking price wars in the tire industry. Recovery officials are generally satisfied with its success in this major instance.

"Monopoly wipes out 'Little Fellows' by low prices



"Just the Signs of Convalescence"—Courtesy of
Chicago Journal of Commerce

and not by high prices," said General Hugh S. Johnson, NRA, at a recent speech in Columbus, Ohio. He continued: "Was it high prices that put hundreds of thousands of small merchants all over the country out of business and put monopolistic Chain and Mail Order stores in their place? Is it high prices that are at this moment closing up thousands upon thousands of tire stores and putting two or three vast rubber and merchandising corporations in full control of that business? Was it high prices that have been wiping out small mills, factories and service establishments during this depression in the worst economic massacre of 'Little Fellows' known in our history? It is monopolistic low prices—prices below cost to all except the mighty that destroys the 'Little Fellow' in business. When the Coal Code raised Coal prices, literally thousands of small mines re-opened. The Cotton Code saved hundreds of small mills from threatened extinction. The Retail Code will save from destruction by Chain and Mail Order Houses thousands upon thousands of small retail stores. The Rubber Tire Code will prevent wholesale economic slaughter on the retail front. The chief protestants of this NRA policy are the Chains and Mail Order Houses and not the 'Little Fellows' and if these schemers and agitators would take the trouble to inform themselves, they might be guilty of less of human degradation and ruined hope." This solicitude for the "Little Fellows" does not jibe very well with some of the General's earlier speeches (see previous issues of ROCK PRODUCTS) nor with the oft-repeated assertions of a year or so ago that the little fellows were standing the gaff much better than the big ones. However, consistency is not one of the sins of NRA, as probably it should not be in any body devoted to economic experimentation.

Maintenance of Re-Sale Price Denied

A decision of NRA of interest to all producers who sell through dealers and jobbers was announced April 30 in denying an application by the code authority of the asphalt and mastic tile industry for approval of the terms of a uniform contract proposed for flooring contractors. Under the terms of the proposed contract, the contractor would be forbidden to sell any product to a purchaser at less than the published price applicable to such class of purchaser; or to effect a lower price "by any means whatsoever," or to use a lower price than that published for all customers of the same class by "the manufacturer." In denying approval of this provision, National Recovery Administrator Hugh S. Johnson stated: "Such clause having the effect of maintaining the contractor's resale price of the product . . . approval is hereby refused and denied to said contract while it contains said clause or any other clause designed to effect control of resale prices by the manufacturer."

Price Fixing Endorsed by Durable Goods Committee

Following the conference of code authorities in Washington, March 7, NRA's chief, General Johnson, appointed a committee to consider recovery problems of the durable or capital goods industries (See ROCK PRODUCTS, April issue). Briefly the committee's conclusions are: (1) That price stabilization in many industries is necessary in an emergency if wages are to be maintained. (2) That the Wagner bill would actually encourage labor trouble. (3) That a general increase in wages and decrease in hours of work would retard recovery. (4) That the number of employees added and wage increases have been "substantially in excess" of the sales trend. (5) That code authorities should be authorized to handle compliance problems to the greatest degree possible.

Prices and Governments

The newspapers are full of hostile news about the increased prices that municipal and other governmental units are being asked for cement, aggregates, and other construction materials. Unfortunately, such news furnishes helpful fuel to keep the political home fires burning. In some few instances, apparently, city governments have accepted the situation as the natural result of returning prosperity. In no instance have we seen any evidence of activity on the part of construction material producers in defending prices—publically. Possibly they have been active elsewhere than in the public print.

Must Not "Offer" to Sell Below Cost

Announcement was made May 15 of the approval by National Recovery Administrator Hugh S. Johnson, effective May 24, of modifications of the approved code for the (dimension) limestone industry. They include: (1) "Offering to sell" below the allowable cost established by the Code Authority shall be unfair trade practice. As the code reads only actual selling is so defined. Reference to the codes of the major rock products industries shows that only cement and gypsum products manufacturers thought to cover this point. The cement industry code reads: "to sell or offer to sell," etc.

Labor on the Rampage

Members of the steel industry unions plan shortly to demand a 6-hour day, 30-hour week and a minimum daily pay of \$6, Clarence Irwin, sixth district president of the Amalgamated Association of Iron, Steel & Tin Workers, stated recently. A walk-out June 20 is threatened unless all the demands are met.

Strikes have already made their appearance in the rock products industry. Employees of two cement plants at Osborne, Ohio, went out May 8. Their demands were

for a 20% wage increase and union recognition. This was part of a general strike at many Ohio industrial plants. There were even numerous strikes of Federal Emergency Relief Administration workers. A strike of sand and gravel plant employees at Massillon, Ohio, was settled in 72 hours by conference with company officials. Quarry workers held a meeting at Waterville, Ohio, May 11, to which they invited farmer delegates as visitors. Later strikes were called at a number of crushed-stone and lime plant quarries in northern Ohio.

In the Birmingham, Ala., district labor conditions are described as critical, because of the elimination of wage differentials between white and colored labor, communistic labor organizations, and plain labor organization racketeering. Armed Negro strikers are said to be responsible for conditions which a few years ago would have called for "a general massacre" of the blacks, in the opinion of Southerners.

Coal Wage Increase Held Up by Injunction

On May 2 Federal Judge Dawson at Louisville, Ky., issued a temporary injunction restraining prosecution of 34 western Kentucky coal operators from obeying the new NRA wage and hour schedule and stated that there was no doubt in his mind of the unconstitutionality of the recovery act as it applies to local business. The mining of coal is intrastate business and not subject to regulation by act of congress, Judge Dawson said. The temporary restraining order prevented the local U. S. district attorney from initiating prosecution of the operators who have refused to put into effect NRA's order for a \$4.60 minimum daily wage for a 7-hour day. The operators are offering \$4 for a 7-hour day which the independent miners' union in several counties has accepted. The old code was \$4 for an 8-hour day.

Weirton Steel Co. Challenges Constitutionality of NRA

The first prosecution of an employer to enforce NRA's interpretation of the collective bargaining features of NIRA is that of the Weirton Steel Co., Weirton, W. Va., in the Federal District Court at Wilmington, Del. The steel company's counsel argued that the NRA is unconstitutional because the delegation of authority was not defined in the act. Regarding the National Labor Board, he argued the act did not delegate to the President the right to create a body with such powers. "The act is unconstitutional," he said, "because under the commerce clause of the Constitution, delegation of executive authority must be definitely limited. The act, therefore, is invalid because that delegation of authority was not defined in the act." He contended the National Labor Board was unconstitutional because the act delegated to the President no power to create such a body with the duties and pow-

ers mentioned in the President's executive order of February 1. He argued that the collective bargaining provisions were unconstitutional as applied to intrastate commerce. He said the Weirton company did not operate in interstate commerce, as it delivered its products to a carrier at the mill. Powers of congress, he insisted, are limited to interstate commerce. "The law specifically provides," he said, "that an employer can not make membership or lack of membership in any organization a basis of employment."

Weirton Steel Under NRA Nevertheless

The New York Central R. R. was granted an allotment of \$2,500,000 for rail equipment by PWA, and the Weirton Steel Co. received a contract from the carrier for \$47,400 for the purchase of steel rails. The difficulty arose over the President's ruling that no public works funds should be allotted to any firm not under the Blue Eagle. The Weirton Co. had been cited by the National Labor Board and the Department of Justice for violations of Section 7A of NIRA. PWA investigated and Administrator Ickes has announced that so far as he is concerned the Weirton company is operating under NRA. Mr. Ickes said the matter was up to NRA officials. "There is nothing we can do about it," he said.

Competition of Prison Made Products

The NIRA, title 2, relating to the construction of public works under PWA, specifically provides that no convict labor shall be employed. The same provision does not apply to RFC jobs and others financed in various ways by the Federal government, and public works financed locally. Hence, rock products producers have a vital interest in the "Compact of Fair Competition for Prison Industries" which has been approved by the President. The governors of 28 states have already signed the compact and more are expected to. Hours of prison labor are limited to 40 hours per week. Prison products are not to be sold for less than fair market prices of competing private industry products, where contracts for the labor of prisoners are made they must insure a return from the contractor of an amount equal in value to the cost per unit of product for labor and overhead necessarily paid in competing private industry on the comparable product. A Prison Compact Authority is created, consisting of nine members, six of whom shall be elected annually by representatives of the signatory states and three to be appointed by the President. The Authority is authorized to hear and adjust complaints arising under the compact, and its decisions are subject to appeal to the President or his designated representative—now the National Recovery Administrator. The 28 states which already are signatories to the Compact are: Alabama, Connecticut, Delaware, Georgia, Illinois, Indiana, Kentucky, Louisi-

ana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Nebraska, New Hampshire, New York, North Dakota, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Vermont, West Virginia, Wisconsin, and Wyoming.

Help for the "Forgotten Man"

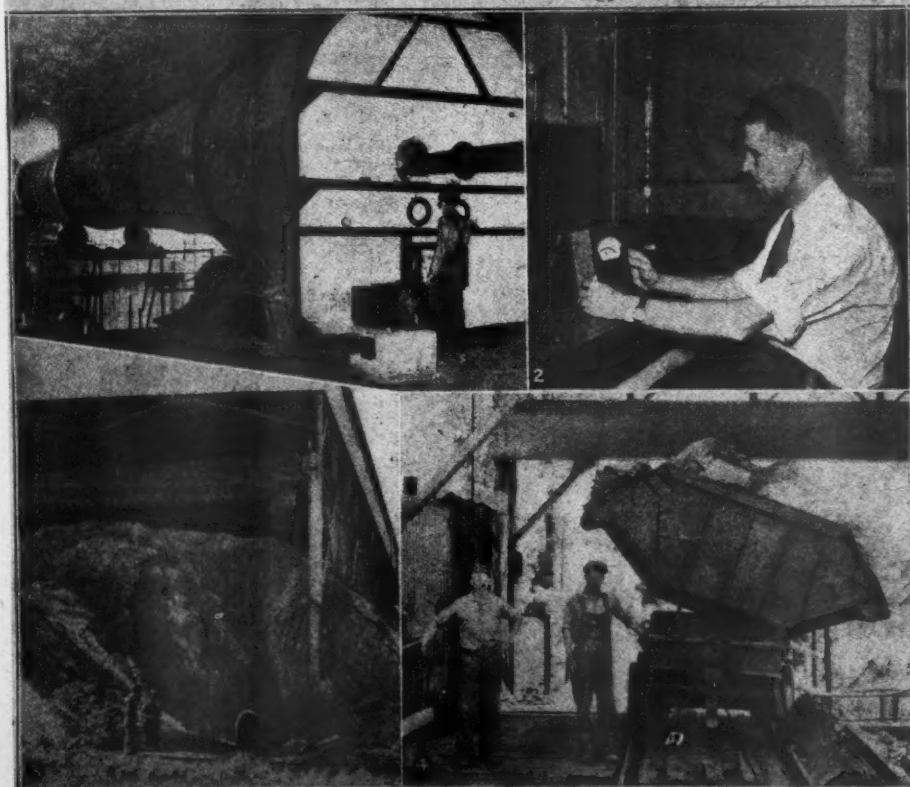
The accompanying reproduction (on a reduced scale) from the Knoxville (Tenn.) News-Sentinel illustrates a recovery measure that is sadly and unfortunately neglected by the rock products industry. The "forgotten man" today is "the poor cuss" with a legitimate job (if his employer can get orders to keep him at work). A good deal of the efforts of government to find employment for unemployed results merely in shifting the burden of unemployment from one group to another. Particularly is this so in the rock products industry where government frequently passes by established plants designed to supply its needs for construction materials to build or lease new ones. The TVA is continually threatening to build a cement plant of its own, and is building its own crushed stone plant. Hence, such publicity as that obtained by the Vol-

unteer Portland Cement Co. in this instance is not only helpful, but to our way of thinking it is the only way industry can obtain a break for the really "forgotten man." It is high time this industry and every industry started cultivating public opinion—at least a public understanding.

Illinois Passes State Law to Support NIRA

Despite of much opposition on the part of organized big business interests the Illinois legislature passed a law giving NIRA the effect of a state statute, as has been done in several other states. The law becomes effective July 1, after which NIRA and code violations can be handled through state's attorneys and state courts. Opposition newspapers carried much propaganda about a surrender of state's rights, police powers, etc., to the Federal Government, but it was hard to see the logic of this stand, when the intent of the law is to relieve federal attorneys and federal courts of cases involving small business or small localities. To the unbiased it would seem that state's rights were being retained when alleged offenders are to be tried in courts of local jurisdiction instead of federal courts, even though the

TVA Order Starts Wheels Turning at Cement Plant



Here they are, back at work at Volunteer Portland Cement Co. making the ingredients that will help knit Norris Dam together.

More than 110 men are employed now that the concern has contracted to supply 125,000 barrels of cement for the dam and Manager Charles P. Lewis anticipates a 25 per cent increase in personnel when the plant really gets rolling on the TVA order.

Volunteer turns out about 45,000 barrels of cement monthly. At that rate the present contract will be completed in three months. The company is hoping others will follow steadily.

In an expansion to meet the big order Volunteer now is increasing its storage building for cement clinker by 40 per cent, giving a space 80 feet wide, 200 feet long and 45 feet tall.

The lower left view shows a mountainous pile of crushed limestone and the expansion under way. The workers, left to right, are G. L. McPherson, S. L. Erfield and Joe Davis.

Lower right, a car of rough stone is being tipped over into the crusher which reduces it to five-lb. pieces which the roller mill can take and reduce to cement dust. Watch James Lee Hamer Lowery are the car men you see.

The man and the instrument—the man is G. L. McPherson, Volunteer expert, and the instrument is tachometer, a newly designed device which determines what is the proper surface area of cement grains for TVA purposes.

In the giant circular kiln, upper left, intense heat from air-blown powdered coal fuses the limestone to fuse into the clinkers which are pounded into the powder wheels to cement.

Cement plant activity featured as recovery news by newspaper

offense charged is a violation of what originally was only a federal law. What the law really does is to put enforcement up to local public opinion, in the case of small offenders, which is logical and in keeping with the spirit of a democracy. It is said the opposition will test the state constitutionality of the law.

Fertilizer Industry Prospers!

The following quotation is an official NRA news release: "A remarkable instance of progress under NRA auspices is reported by the code authority for the fertilizer industry. 'Figures just released for the month of March,' says the report, 'prove that one of the main objectives of the fertilizer code has been realized. For that month, employment was 89% and payrolls 108% greater than for March of last year.' Though sales have not increased as rapidly as payrolls, the elimination of waste and the curbing of improper trade practices under the code will probably enable the manufacturers to make a profit this year for the first time since the depression began."

What that news release does not say is that AAA and all the other agricultural agencies are as much responsible for the prosperity of the fertilizer industry as NRA and its NIRA code. The farmers have been bribed to cut down acreage; but in most instances they are endeavoring to raise as much as before. This requires the use of more fertilizer than has been sold in several years. The money to buy fertilizer is probably the same money the government gave the farmers to reduce acreage, ostensibly to reduce crops.

Building Permits on the Increase

Rising 14.7% over March, building permit values during April showed a much more than seasonal increase, which for this period is usually about 6.5%. Compared with March a year ago the increase amounted to 32.5%. The monetary value of permits filed during April for new buildings, alterations, additions and repairs for 215 cities of the United States, as reported to Dun & Bradstreet, Inc., totalled \$29,262,666, compared with \$25,505,005 during March and \$22,091,417 for April a year ago.

President for Spending on Housing Program

In his message to congress requesting legislation to support a vast program for Federal financing of housing President Roosevelt said:

"Many of our homes are in decadent condition and not fit for human habitation. They need repairing and modernizing to bring them up to the standard of the times. Many new homes now are needed to replace those not worth repairing.

"The protection of the health and safety of the people demands that this renovizing and building be done speedily. The federal government should take the initiative im-

mediately to cooperate with private capital and industry in this real-property conservation. We must lay the groundwork for this effort before Congress adjourns its present session.

"The purpose of the program is twofold: first, to return many of the unemployed to useful and gainful occupations; second, to produce tangible, useful wealth in a form for which there is great social and economic need.

"The modernization phase will furnish national guidance in support for locally managed renovizing campaigns throughout the country and protection for home owners against unwarranted cost advances. For these purposes, and to assure adequate financing at low cost, and on moderate terms of repayment, the new governmental agency is required.

"Modernization of commercial and industrial structures is envisioned, as well as residential, but the new features providing governmental assistance are confined largely to home improvements."

The rest of the message details the proposed procedure for making loans through two new government corporations, one the Home Credit Insurance Corp. (HCIC) and the other the Federal Savings and Loan Insurance Corp. (FSLIC). If carried out according to the President's wishes perhaps several billion dollars will be put into circulation for home building and rehabilitation, although, of course, it will not all be federal money.

Charles Edison, son of the late Thos. A. Edison, in addition to many other interests president of the Edison Cement Corp., has been selected by President Roosevelt to head this new government activity.

No Highway Funds Provided Beyond July 1, 1934

Up to this writing Congress as yet has made no specific provision for continuing federal aid highway construction beyond the end of the present fiscal year, which ends July 1, 1934. A bill (Cartwright road bill H. R. 8781) is before Congress providing for \$400,000,000 to be spent about as was the \$400,000,000 provided in NIRA, plus \$50,000,000 for roads in federal parks, public lands, etc.

Only NRA Can Give and Take Away Code Eagles

NRA Administrator Johnson has issued the following: "There is a misunderstanding on the part of several Code Authorities with regard to the Blue Eagle. This NRA insignia has always been and will continue to be the property of the United States Government and the symbol of compliance with NRA codes and agreements. Its use will be jealously guarded by the NRA. It will not be issued to those who are certified to the issuing agency as code violators and it will be withdrawn from those who have been administratively found to be in violation of their code at a hearing at which

the person complained against was given the right to appear and state his side of the case. The fact that each Blue Eagle card now bears the name of the particular trade or industry in which the employer is primarily occupied, does not change its status in the slightest.

"Some code authorities object because distribution is by NRA and not by the code authority. In almost all instances this is because they want to withhold the insignia for non-payment of assessments. The status of the contributions to the expenses of the administration of codes has been made absolutely clear in recent orders. Non-payment of such contributions is only a code violation where there is a code provision requiring payment on the part of individual members and then only after an itemized budget and basis of contribution has been approved by the NRA. Industries can solve this assessment problem by adopting such a provision where there is none already in the code."

Construction Costs Rising

PWA has found it necessary in numerous instances to increase allotments for jobs to keep them from being abandoned. Prices of eight principal construction materials increased approximately 20% from April, 1933, to April, 1934, according to the Associated General Contractors of America. With higher wage levels and material costs, this agency estimated that the increase in construction costs was over 10%. Recently, the PWA amended a grant of \$160,000, covering 30% of the estimated cost of labor and materials to be used in building 15 school houses in Montgomery County, Md., to allow use of the entire grant on three buildings. Original estimates allowed \$531,320 as the cost of labor and materials on all 15 buildings. When bids were received, it was found that more than this would be required for only three buildings. The Administration has been able to meet higher costs because some political subdivisions, apparently having lost their desire to obligate public funds, have cancelled their negotiations with PWA for loans and grants.

Evidence of a Mean Disposition?

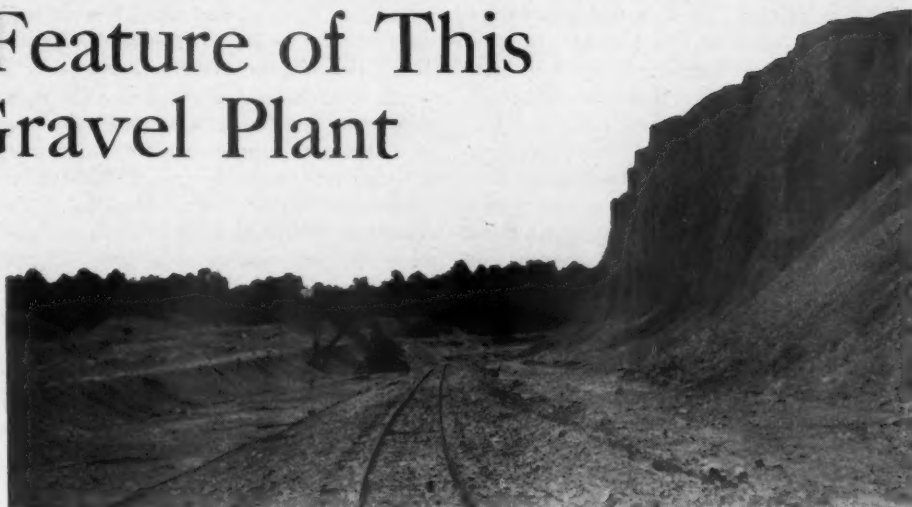
Chagrined by the uniformity of prices bid on cement for various PWA projects Administrator Ickes is reported to have adopted a plan of awarding contracts to manufacturers farthest removed from the job. By doing this he explains he is providing the railways with revenue at no cost to the government (incidentally, of course, preventing the cement manufacturers who are awarded the contracts from getting a profitable price).

Profits of Recovery?

Senator Wagner, speaking before United Synagogue of America, says that recovery has caused industry to return to its selfish, "purely economic" attitude without regard to general welfare.

Simplicity Feature of This Road Gravel Plant

Memphis Stone and Gravel Co.'s Camden, Tenn., Plant Uses Chiefly Gravity Grizzlies for Sizing



Pit of Memphis Stone and Gravel Co., Camden, Tenn.

SIMPLICITY in every detail and economy in power are the features of the Camden, Tenn., plant of the Memphis Stone and Gravel Co., built about four years ago.

The country is hilly and the plant is placed in a ravine, so that the cars from the pit dump at the top of the plant, without the use of any incline. The pit is long and narrow, extending for a considerable distance from the plant. A short way from the plant it curves around a ridge of ground so that on the side against the ridge the face is 30 to 40 ft. in height, while on the other side the cut is barely 10 ft. below ground level. The deposit yields a well graded product, but it contains a considerable amount of clay. Since there has been a good demand for bank-run road gravel, the company has not started to wash the clay from its product and shipments are made of screened but unwashed material.

A 2-cu. yd. Bucyrus steam shovel fitted with caterpillar treads is used to remove the material from the high side of the pit, while a railroad-type 5-cu. yd. Marion steam shovel is used on the other side of the pit. Loading is done to 5-cu. yd. Western dump cars operating on a 36-in. track which runs down the middle of the pit. An 18-ton saddle-tank steam locomotive is used to pull the cars to the plant.

The ravine in which the plant is located

has a very steep bank on the side toward the pit, so that with only a few feet of timber trestle, the tracks are carried from the bank over to the top of the plant. Beside the track at the top of the plant are the 12x12-ft. grizzlies to which the cars dump. There are three at present, occupying three of the corners, with space for a fourth grizzly should it be desirable to install another. To permit trains of several cars to reach any of the three grizzlies, the trestle has been extended beyond the plant and out toward the far side of the ravine.

The grizzly nearest to the pit has bars spaced about 6 in. apart and inclined downward at about 20 deg. from horizontal. Although this angle does not give rapid clearing of the grizzly it permits most of the material to pass through and the larger stones can be readily shoved off if they fail to roll down of their own accord. The throughs drop to a hopper which feeds directly to a pair of Deister "Plato" vibrators. The throughs from the pair of vibrators drop directly to bins beneath the screens while the rejects are chuted to a Williams "Jumbo" crusher on the ground floor of the plant.

One of the other two grizzlies has its bars spaced about 8 in. apart and inclined downward at about 20 deg. Directly beneath this grizzly is another with bars spaced about

2 in. apart and inclined downward at a considerably steeper angle. The material which passes both of these grizzlies goes directly to the bin beneath which the rejects of the lower grizzly are carried back to the crusher by means of a 24 in. Link-Belt conveyor. The rejects of the upper grizzly, as well as the stones which fail to pass the grizzly above the vibrators, are discarded, or may be broken up by hand and sent through the plant again.

The third grizzly to which the pit cars dump has the bars spaced only 4 in. apart and is used for obtaining a rather fine product. The grizzly below this one has the bars spaced less than 1 in. apart and gives a small-sized product. The inclination of these two bar grizzlies is the same as for the pair just described above. The throughs of both these grizzlies drop directly to the bin, while the rejects of the lower grid is chuted to the crusher. The rejects of the upper grizzly are discarded or broken by hand.

The crusher is located directly below the pair of vibrator screens and between the two railroad tracks that run under the bins at each side of the plant. The discharge of the crusher is delivered to a Link-Belt bucket elevator and taken up to the top of the plant where the material can be chuted to the bins under the vibrators or the bins under



Left: Sand screening plant of Memphis Stone and Gravel Co., Camden, Tenn. Right: Upper floor of plant where pit cars dump to bar grizzlies

the 1-in. grizzly. If it is desirable to re-screen the material, the chutes can be changed so that it is delivered to a Link-Belt conveyor which takes it across the plant and deposits it on the vibrators.

The bins beneath the grizzlies have sloping bottoms to facilitate the loading to cars on the tracks below. There are two tracks passing directly beneath the bins and a third just to one side of the plant for storage and switching. No truck loading is done.

Power for operating the plant is furnished by a 180-hp. Diesel engine in the power house beside the plant. The crusher is driven by a belt directly from the engine while the conveyors and bucket elevator are driven from the crusher by a power take-off on the far side, which turns a main line shaft.

The plant itself is of heavy timber construction and is well covered over so that the elevator, grizzlies and other equipment is not exposed to the weather. The power house is of corrugated iron. The local office of the company is adjacent to the plant, but the main office is located in Memphis. W. B. Lewis is superintendent.

Cement

Portland, Ore.—Nine firms submitted bids to the U. S. Engineer's office for furnishing 300,000 bbl. of cement for the Bonneville dam. Eight bids were according to the code and identical, the ninth bid, that of W. C. Delbrueck & Co., Inc., Portland, being low at \$1.90 per bbl. Delbrueck specified that he would get his material from Brevick, Norway. He bid on section B, which called for f. o. b. barges at Bonneville-Columbia River. All other bids were \$2.02. On Section A, f. o. b. cars at mill shipping point, Yosemite Portland Cement Co., Merced, Calif., was the only bidder, but its figure, when shipment was included, totaled the same as the others. All other firms bid on Section B, f. o. b. cars, Bonneville. Among the firms bidding were: Beaver Portland Cement Co., Oswego, Ore.; Pacific Portland Cement Co., Redwood Harbor, Calif.; Calaveras Cement Co., Calaveras, Calif.; Yosemite Portland Cement Co., Merced, Calif.; Santa Cruz, Portland Cement Co., Santa Cruz, Calif.; Oregon Portland Cement Co., Oswego, Ore.; Oregon Portland Cement Co., Lime, Ore.; Monolith Portland Cement Co., Monolith, Ore.

British Columbia Cement Co., Ltd., Bamberton, B. C., announced a shutdown from April 30 to October 1, during which time an extensive rehabilitation and modernization program will be carried through. Shipments will continue from a stock of 140,000 bbl.

New York State plants at Hudson (Universal Atlas and Lone Star), Glens Falls, Howes Cave (North American), Catskill (North American), Cementon (Alpha), are

reported to have opened May 1 with prospects the best in the last two or three years. The *Knickerbocker Press* (Albany) devotes a full column by a staff writer to interviews with various company officials, most of which are optimistic. The Alpha plant at Cementon is virtually new, \$700,000 in improvements having been completed. The newspaper writer concludes: "New York State this year will spend at least \$13,000,000 in constructing new highways and maintaining present roads. The Legislature added \$5,000,000 to the original \$8,000,000 in Governor Lehman's budget after the Republicans had put up a fight for \$17,000,000. This expenditure will strengthen the cement industry in the state, which has been most seriously affected by curtailed expenditures for new road construction because of the diverting of gasoline tax revenues into other channels. Another encouraging prospect is the likelihood of New York State being allotted approximately \$22,000,000 additional in federal funds for new road construction purposes, is still pending in Congress. The New York State Legislature has appropriated \$22,000,000, contingent on the passage of the bill in Congress, passage of which would throw a total of \$44,000,000 additional into the highway program in New York. Leaders in the cement industry agree that if Congress does pass the federal aid road construction bill, the industry will actually boom. Various officials interviewed noted a decided pickup in private construction.

Glens Falls Portland Cement Co., Geo. F. Bayle, Jr., vice-president, had the courage to protest the method of construction of a concrete pavement in his home town. The pavement was laid over the ties of an abandoned street railway. Mr. Bayle wrote to the mayor: "As cement manufacturers, interested primarily in the reputation of concrete pavement, and also as one of the heavy taxpayers in the city, we must object most strenuously to the method used in laying this concrete." Apparently he got small thanks for his protest.

Pennsylvania-Dixie Cement Corp. has announced the appointment of R. H. Baker as sales manager for the Chattanooga district. His assistant sales managers are F. V. Clicquennoi, E. J. Head and H. Magrath. In making the announcement, Walter S. Wing, general sales manager, said, "The Chattanooga district is one of our most important territories since it embraces nine of the southern states and Mr. Baker's training and experience have made him broadly familiar with the construction activities and problems in that area; he prepared for his career at the University of Tennessee; during the World War he served as first lieutenant, spending more than a year at the front; from 1920 to 1928 he served in engineering positions with the State Highway Department of Tennessee, and in 1929 was active with the Tennessee Road Builders' Association.

From 1929 to 1933 Mr. Baker served as Commissioner of the Tennessee State Highway Department, during which time approximately \$110,000,000 was expended in highway construction under his administration; and from August 1933 to February 1934 he was a member of the State Advisory Board of the Public Works Administration. Mr. Baker and his assistants are well qualified to achieve our objective, which is to furnish increasingly beneficial service to the trade in that important territory."

Northwestern Portland Cement Co., Grotto, Wash., won a Superior court suit based on a claim that dust from its stack damaged crops and permeated the dwelling of the plaintiff, three-quarters of a mile distant.

Northwestern States Portland Cement Co., Mason City, Ia., has won a long drawn out suit designed to prevent its reincorporation in Iowa. The company formerly operated under a West Virginia charter.

Southwestern Portland Cement Co., Victorville, Calif., had a chance to prove the value of first-aid training of its employees in a peculiar way. A 16-month old youngster nearly lost his life by having a pebble lodged in his throat. The only two doctors ordinarily available were absent from the town. The *Los Angeles Times* describes what happened as follows: "Then someone remembered the former excellent work of the first-aid team at the Southwestern Portland Cement Co. plant and brought Harry Sargeant, who has charge of the work. He quickly applied the usual manual treatment for such cases, but that failed to dislodge the stone. Having no doctor's forceps for such work he quickly bent a pair of long tweezers so that he was able to reach down into the child's throat and pick out the stone just in time."

Sand and Gravel

Lancaster Gravel Co., Lancaster, Ohio, has established a new plant near Hooker's Station. J. B. Clawson, Columbus, Ohio, and Paul S. Kline, Columbus, are the proprietors.

Dallas County, Texas, recently discovered that producing its own sand and gravel was an expensive luxury. In 1920 the county commissioners made a contract for the purchase of four acres at \$30,000, from which the county expected to remove 70,000 cu. yd. of sand and gravel, or to get it from adjoining property if necessary. About 4000 cu. yd. were recovered and then the county found out that there was no more sand and gravel either in the four acres, or those surrounding them. The cost (for capital investment alone) was therefore better than \$7 per cu. yd. now, 14 years later, an attempt is being made to recover some of the \$30,000.

Grinding Plant Research*

Part IX—New Surface Produced by Grinding

By William Gilbert

Wh.Sc., M. Inst. C. E., London, England

THE NEW SURFACE produced by crushing or grinding is proportional to the energy expended and the work done is proportional to the area sheared, according to Rittinger's law. In most forms of crushing or grinding machinery the particle size is mainly reduced by shearing. In applying Rittinger's law the surface area of a definite weight of material at various stages of the crushing or grinding process must be estimated. This is tedious but gives valuable information as, for instance, in a comparison of the material produced by open and by closed circuit grinding.

The particle surface area of fine powder may be obtained: (a) By dividing the sample into a number of grades by sieving, elutriation or sedimentation, observing the average particle width in each grade by a microscope, and from the average width calculating the particle surface area; (b) by immersing the sample in a suitable acid when the loss of weight per hour is assumed to be proportional to particle surface area.

Method (a) is likely to be increasingly used, since the distribution of the surface area over particles of various widths can be examined in detail. Method (b) has yielded useful results, but its application is limited, since it can only be applied to simple substances like sand. In what follows some of the new surface measurements made by the British Portland Cement Research Association under the direction of the writer will be described.

In the investigation of the new surface produced by grinding standard sand the sand was ground to a residue of 6.76% on the 180 mesh sieve in the 18-in. experimental mill as already described. The sand passing the 180 mesh sieve was divided into five grades by sedimentation, in accordance with a method described by Sir Daniel Hall, F.R.S., in the transactions of the Chemical Society of England, Vol. 85. The method was used at the Agricultural Research Station at Rothamsted in grading the particles of various soils after the calcium carbonate and organic matter had been removed. This method was adopted by the writer since it is capable of dealing with the smallest particles produced by grinding.

Following Hall's method, a glass jar 7.5 cm. in diam. and 10 cm. deep was used, as shown in Fig. 51. A mark, *A*, was made 1 cm. from the top. Seven grams of the

ground sand were put into the jar, which was then filled with distilled water to the mark *A*, the sand and water being lightly stirred by a cylindrical block of rubber mounted on a glass rod. The jar was allowed to stand for 6 hours, after which the turbid liquid was siphoned off to a mark *B*, 7.5 cm. below mark *A*, leaving the sediment in the jar.

The jar was then refilled with distilled water to the mark *A* and, after stirring, again allowed to stand for 6 hours. The process was repeated until the superimposed liquid was quite clear after 6 hours, that is to say, until all particles which would not fall 7.5 cm. in 6 hours had been removed.

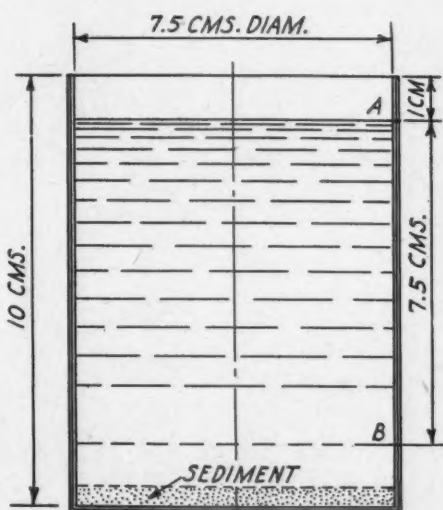


Fig. 51. Container used in segregating fine particles by Hall's sedimentation method

The turbid liquid which had been siphoned off was evaporated, and the residue (which constituted the 6-hour grade) was dried and weighed.

To obtain the 1-hour grade the jar was again filled with distilled water to the mark, *A*, and the sediment stirred up. It was allowed to stand for 1 hour, after which the turbid liquid was siphoned off to the mark, *B*. The process was repeated until all the particles which would not fall 7.5 cm. in 1 hour were removed. The liquid which had been siphoned off was evaporated, and the residue dried and weighed, thus giving the 1 hour grade.

A 10-minute grade and a 100-second grade were obtained in the same way. The sediment remaining in the jar was composed of material which had passed the 180 mesh

sieve, but which was capable of falling through more than 7.5 cm. of water in 100 seconds. The flask was usually filled from 6 to 10 times in order to obtain a single grade. The weight in each grade of the sample of sand, as obtained by sieving and by sedimentation, was as follows:

Grade	Weight in each grade
Residue on 180-mesh.....	6.76%
Sediment	48.18%
100 seconds	22.02%
10 minutes	13.98%
1 hour	6.83%
6 hours	2.23%

In the paper previously referred to, Hall applied Stoke's law to calculate the range of particle width in each grade. The results were confirmed by measurements made with a suitable microscope. Stoke's law, which relates to the uniform velocity attained by a spherical particle, when slowly falling through a fluid, is applicable when the square of the velocity is small enough to be neglected. It is used with good results when the particles are not spherical by using the particle width instead of the diameter.

The table below, taken from Hall's paper, shows the agreement between the particle width as measured and as calculated from Stoke's law. The grades differ somewhat from those used by the writer on standard sand.

Depth of fall	Time of fall	Maximum particle width in microns Calculated at 50 deg. F.	Measured
7.5 cm.	1¼ min.	40.00	40.00
7.5 cm.	12½ min.	12.66	10.00
7.5 cm.	2 hr. 5 min.	4.00	3.98
8.5 cm.	24 hr.	1.27	2.00

New Surface Produced by Grinding Standard Sand

After obtaining the weight of sand in each grade a small portion of each grade was spread out on a microscopic slide, the eyepiece of the microscope being provided with a scale which could be brought into focus with the particle. The slide and the particles could be traversed in two directions at right angles, thus enabling the width of a large number of particles to be measured. All the measurements were made in the same direction, and along a line which bisected the area.

The widths of about 500 particles in each grade were carefully measured and the result is shown in Table XIV. The particle width is expressed in units of $\frac{1}{10,000}$ in. in all cases, and not in microns. Stoke's law

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was not used when the earlier estimations of new surface were made, but later it was found to be of considerable assistance.

TABLE XIV.—WEIGHT AND SURFACE OF EACH GRADE IN 1 LB. OF STANDARD SAND

Ground to a Residue of 6.76% on 180-Mesh (Aperture 38), 7.5 cm. Fall in All Cases

Grade	Weight in grade	Range of particle width, Unit = $\frac{1}{10,000}$ in.	Surface in sq. ft. per lb.
Residue on sieve ap. 38	6.76%	47	6.3
Sediment	48.18%	36 to 14	90.8
100 seconds	22.02%	14 to 7	95.7
10 minutes	13.98%	7 to 3	130.0
1 hour	6.83%	3.0 to 1.2	152.6
6 hours	2.23%	1.2 to 0.4	134.7
Total			610.1

Calculation of Particle Surface Area

The range of particle width in each grade having been measured, it remains to calculate the corresponding surface area. Each particle is treated as a cube, the measured width being taken as the length of one side, and from the equivalent cube the surface area in sq. ft. per lb. is deduced. The method does not give the actual surface area of irregular particles but for samples of the same material, ground in the same mill or in mills of similar type, it is comparative. An estimation of the probable error for particles of various shapes is given further on.

Let S = surface area of particles in sq. ft.

d = average particle width in units of $\frac{1}{10,000}$ in.

W = weight of material in lb.

ϕ = specific gravity of material.

The weight of a particle of width d , treated as a cube is

$$\left(\frac{d}{10^4}\right)^3 \times 62.4 \times \phi \text{ lb.}$$

The number of particles in the grade is

$$\frac{1728 W}{1728 \times \left(\frac{d}{10^4}\right)^3 \times 62.4 \times \phi} = \frac{W}{d^3 \times 62.4 \times \phi}$$

The surface area of each particle treated as a cube is

$$6 \times \left(\frac{d}{10^4}\right)^2 = \frac{6 d^2}{144 \times 10^8} \text{ sq. ft.}$$

Hence the total particle surface area in the grade is

$$\frac{6 d^2}{144 \times 10^8} \times \frac{1728 \times W \times 10^{12}}{d^3 \times 62.4 \times \phi} \text{ sq. ft.}$$

$$\text{or } S = \frac{11530 \times W}{d \times \phi} \text{ sq. ft.} \dots (10)$$

The same result would be obtained if the particles were treated as spheres of diameter d instead of cubes of side d .

For standard sand the value of ϕ is 2.628, hence $S = \frac{4390 \times W}{d} \dots (11)$

For several of the coal mills tested, $\phi = 1.40$, so that for coal $S = \frac{8236 \times W}{d} \dots (12)$

In Table XIV, the weight of the material in each grade is assumed to be uniformly distributed. Taking the 100 seconds grade, for instance, the weight of the particles whose widths lie between 7 and 8 units, is assumed to be the same as the weight of the particles whose widths lie between 13 and 14 units. The error likely to be caused by this assumption can be seen later.

By a simple integration of formula (11) it may be shown that

$$S = \frac{10,110 W}{(A-B)} \log \frac{A}{B} \dots (13)$$

where A = width of largest particle and B = width of smallest particle.

Taking, for instance, the 6-hour grade of Table XIV we have, $A = 1.2$ and $B = 0.4$,

$$\text{and } \log \frac{A}{B} = \log \frac{1.2}{0.4} = \log 3 = 0.4771$$

$$\text{also } \frac{W}{A-B} = \frac{2.23}{100 \times (1.2-0.4)} = \frac{2.23}{80}$$

$$\text{hence } S = \frac{10,110 \times 2.23 \times 0.4771}{80} = 134.7 \text{ sq. ft.}$$

The formula is useful when dealing with the smaller grades, but for the larger grades it is sufficient to take the average particle width in the grade and to use formula (10).

The information given in Table XIV is shown in greater detail by the graph in Fig. (53). It relates to 1 lb. of material which has passed the 180-mesh sieve, and shows the weight per cent. and the surface per cent. is included in each unit of the particle width. The base line represents the particle width, the distance OA being the aperture

width of the 180-mesh sieve, which is 38, when expressed in units of $\frac{1}{10,000}$ in.

The upper rectangles refer to the weight, the limits of each grade, in terms of the particle width, being obtained from Table XIV. Taking, for instance, the 10-minute grade, since the 6.76% residue on the 180-mesh sieve is now omitted, the grade contains $\frac{100}{93.24} \times 13.98 = 15.0\%$ of the weight.

It is represented on the graph by the rectangle $B C D E$.

The line $D E$ measures the range of particle width in the grade, which is from 3 to 7 units, hence the height of the rectangle $E C$ is $\frac{15.0}{(7-3)} = 3.75\%$, according to the scale

on the right. The weight diagram shows therefore the percentage of the weight which comes between each unit of the particle width.

The surface diagram, below, is plotted from the weight diagram. Consider, for instance, the range of particle width from 4 to 5 which is marked $F G$ on the graph. The weight of material in this range is 3.75%, or 0.0375 lb., and its surface area by formula (13) is $10,110 \times 0.0375 \times \log \frac{5}{4} = 36.7 \text{ sq. ft.}$

From Table XIV the sand passing the 180-mesh sieve has a surface of $\frac{610.1-6.3}{0.9324} = 648 \text{ sq. ft. per lb.}$, hence the surface per cent. is $\frac{36.7}{648} \times 100 = 5.67$.

The exact distribution of the weight and

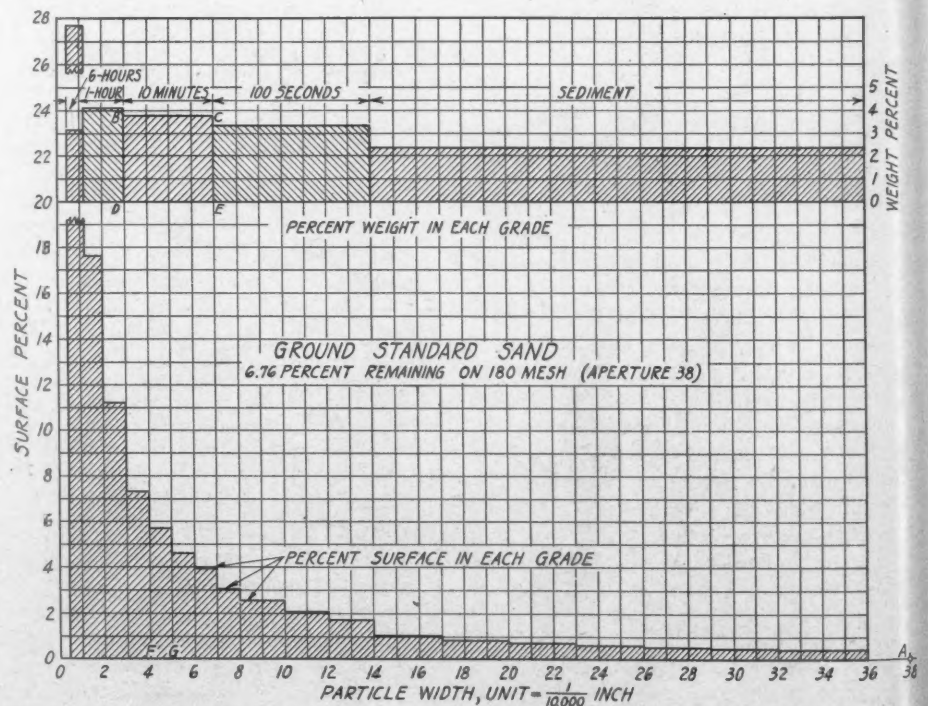


Fig. 53. Graph showing distribution of weight and surface area of sand particles

surface for particles less than 1 unit in width is doubtful, and in the later experiments on the grinding of standard sand a 24-hour grade was added, the particle width being calculated by Stoke's law. The diagram shows clearly the range of particle width from which the bulk of the surface area is drawn.

As an example of the use which may be made of this class of diagram reference is made to the air analyzer now used by the Associated Portland Cement Manufacturers, Ltd., in determining the percentage of flour in portland cement. The analyzer is an improved form of that devised by Pearson and Sleigh of the U. S. Bureau of Standards and has a single tube with an air of velocity of 21 ft. per min.

By Stoke's law the largest particle which can be lifted at that velocity has a width of 33.8 microns, equal to 14 units of $\frac{1}{10,000}$ in.

(nearly). With a small allowance for clearance this analyzer may be said to represent sieve aperture 76, that of the 180-mesh sieve being 38.

The effect of separating out all particles less than 14 units wide from the sample of ground standard sand can be seen from Table XIV. All grades below the "Sediment" would be blown off in the analyzer, hence the percentage of what is termed "flour" by weight is

$$100 - (48.18 + 6.76) = 45.06.$$

The surface area of the particles driven off is, however, $610.1 - (90.8 + 5.3) = 513$ sq. ft., or 84% of the total. The former figure is usually given, but the latter is of much more importance.

Probable Error of Surface Calculations in Measurement of Particle Width

Particle surface areas per pound, when calculated as previously described, should be comparative for similar materials, if they have been ground in mills of the same type. It is, however, desirable to estimate what the error of the method may be, when dealing with particles of various shapes, in order that comparison may be made with surface estimations obtained by dissolution in acid.

Suppose a particle 10 units long, 6 units wide and 4 units thick to be lying on a microscopic slide and on the 10x6 face, as shown in Fig. 54, which is drawn to an enlarged scale. Under the microscope the width may be measured in any direction, such as AOA or BOB , depending on the position taken by the particle on the slide.

To obtain the average width which would result from the measurement of a large number of similar particles, 24 lines such as AOA , but 15 deg. apart (thus occupying a complete circle) were drawn and measured. The average length of the 24 lines was found to be 8.59 units.

Following the method previously used, the surface area of the particle, treated as a cube is 6×8.59^2 .

The weight of the cube (density = 1) is 8.59³, hence the surface area per unit of weight is

$$\frac{6 \times 8.59^2}{8.59^3} = \frac{6}{8.59} = 0.699.$$

The actual surface area of a particle $10 \times 6 \times 4$ is 248, and the weight (density = 1) is 240, so that the actual surface per unit of weight is

$$\frac{248}{240} = 1.03$$

Hence we obtain

$$\frac{\text{Actual particles surface per lb.}}{\text{Calculated surface per lb.}} = \frac{1.03}{0.699} = 1.48$$

To obtain the actual surface, it is therefore necessary to multiply the calculated surface by 1.48. To assist in estimating the probable error when dealing with particles of various shapes, the graph shown in Fig. 55 was prepared. It deals with five groups of rectangular particles, the dimensions in plan being 10x10, 10x8, 10x6, 10x4 and 10x3 respectively. The thickness of the particles in each group may range from 2 to 10. Taking the curve AB , for instance, it relates to particles resting on a face 10x6. For a particle of thickness 4, the point C is obtained,

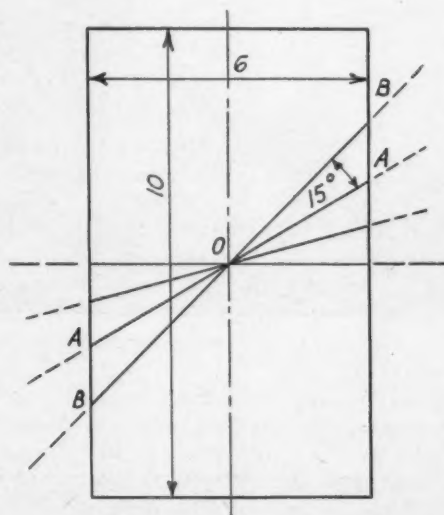


Fig. 54. Method of estimating error in measurement of particle width

and from the scale on the left the ratio of the true surface to the measured surface is read off as 1.48. For a cubical block 10x10x10, the graph at the point D shows that the measured surface should be multiplied by 1.13 in order to obtain the true surface.

The error depends on the ratio between the three sides, and not on the actual dimensions. Hence the range included on the graph will probably cover most particle sizes which occur in practice. Due allowance must of course be made for particles of irregular shape.

It is seen that the estimation of particle surface area by grading and measurement of the particle width gives too low a result. For a material like standard sand, when

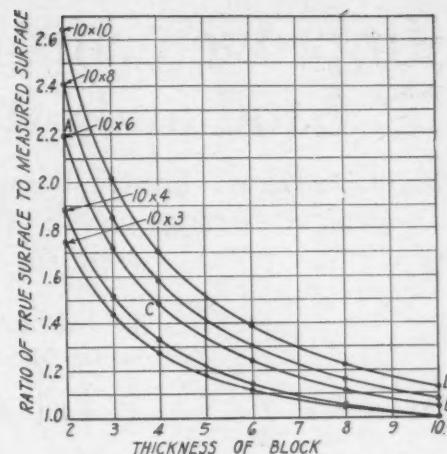


Fig. 55. Graph showing error in measurement for different dimension ratios

ground in a tube mill, a multiplier ranging from 1.5 to 2.0 may be necessary if comparison has to be made with the dissolution method.

Estimations of surface area, on the same sample of ground material, by grading and measurement, can be repeated with accuracy, thus showing that for comparative purposes the method is reliable.

(To be continued)

Cement

Lone Star Cement Co., Hudson, N. Y., is building a new laboratory, modern in every detail.

◆ ◆ ◆

Japan's exports of portland cement to Peru have increased from 4% of Peru's total imports of cement in 1932 to 32% in 1933.

◆ ◆ ◆

Lone Star Cement Co., Bonner Springs, Kan., has been added to the list of International Cement Corp. plants which is manufacturing "Incor" high early strength cement.

◆ ◆ ◆

Alpha Portland Cement Co.'s plants so far this year have run at somewhat increased capacity as compared with the corresponding period of 1933. G. S. Brown, president, told stockholders at the annual meeting. Mr. Brown, replying to the question of a stockholder as to the prospects for 1934, declared that while it was still too early to venture a prediction, he was hopeful that Alpha's shipments this year will show an appreciable gain as compared with 1933. As to the profit showing, he explained that much depends on stability in cement prices, the wage situation and the level of costs of materials entering into the production of the company's lines. At the organization meeting, F. G. McKelvy was appointed executive vice-president, a newly created position. Mr. McKelvy's former post of vice-president in charge of operations has been filled by the appointment of John F. Magee.

Improvements to the "Best of Sand and Gravel Plants"

Aluminum-Alloy Shovel Dipper Increases Capacity—Ingenious Arrangement of Field Belts for Conveying from Pit to Plant

**By Edmund Shaw,
Contributing Editor, Rock Products**

THE PLANT of the Kaiser Paving Co., at Radium, Calif., is well known to the sand and gravel industry because it is one of the largest and finest plants ever built. In fact the writer knows of no plant that can compare with it in the elaborate arrangements which enable it to make many products and to screen, and rescreen and wash and rewash them until the washing and screening are as nearly perfect as possible. Furthermore, it is a beautiful plant, standing in a great green lawn with flower beds and shrubbery, the type of plant which it is hoped another generation will see built in all industries.

The entire operation was described in detail in *Rock Products*, August 15, 1931, and September 24, 1932 (changes and improvements). In the main it is now as it was then. But in one part of the operation, the digging of the material, improvements have been made that have given it a considerable increase in capacity with a comparatively small increase in capital cost and a decreased operating expense. And these changes are such a radical improvement over previous methods that every aggregate producer should be interested in them.

Aluminum-Alloy Dipper

The most unusual feature is the substitution of a dipper of an aluminum alloy for a steel bucket on the power shovel that digs the bank material. The shovel, of P. & H. make, had originally a 2½-yd. steel dipper of standard construction and weight. But the difference between the weights of the aluminum alloy and steel is so much that it is possible to use a 4¾-yd. dipper of the alumi-

num alloy, the net weight of dipper and load being practically the same in both cases.

By making this change the plant output was brought up to 700 tons per hour with one shovel working.

Another important improvement (described in *Rock Products*, September 24, 1932), is the substitution of belts for cars the entire distance from the shovel to the plant. The use of belts in pits is fairly common of course, but the writer recalls only one other

Boom conveyor throws strippings into the pit where they do not interfere with the shovel

girder or bridge-work 120 ft. long, which carries a conveyor belt. This hopper end of the bridge is on wheels and is movable, and it is shifted to keep up with the shovel.

The other end is pivoted on a stationary frame that is above the first of the belts that convey the material to the plant.



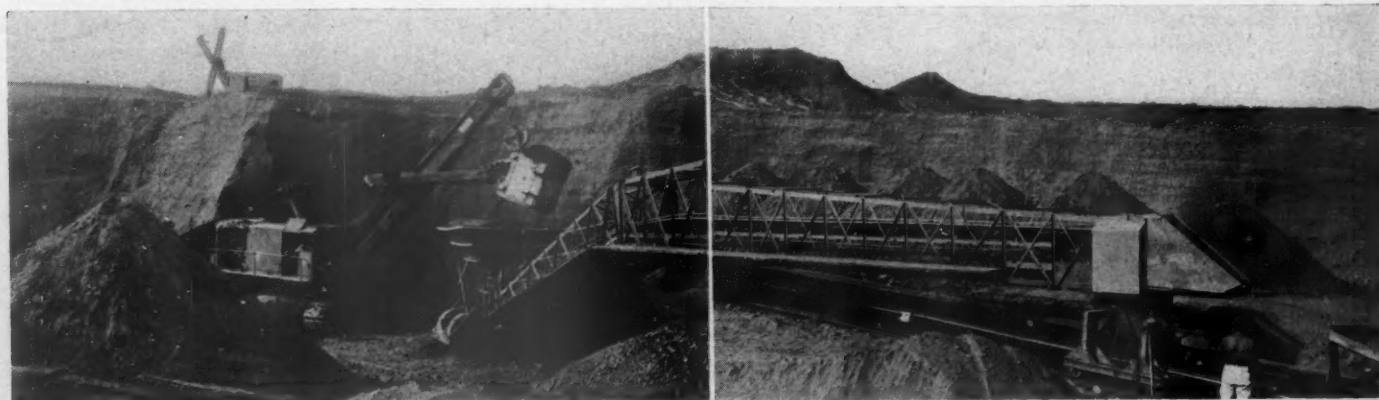
Washing and screening plant of the Kaiser Paving Co., Radium, Calif.

installation (at a chalk quarry for cement in Demopolis, Ala.) as long and as well designed as this. There are over half-a-mile of belts in all, but the longest single section is 600 ft. All belts are 30-in. wide and they are run on "Rex" (Chain Belt Co.'s) and Link-Belt Co.'s pulleys and idlers.

The shovel dipper drops its load into a hopper that is on one end of a pendulum

To insure a steady feed of material to the belt there is a tractor type feeder at the mouth of the hopper.

When the shovel can no longer reach the hopper conveniently the hopper is attached to the dipper with a loop of chain and the dipper is raised and swung until the hopper is in a better position. The shift takes only a minute or two.



Shovel with 4¾-yd. aluminum-alloy dipper and hopper end of swing conveyor. Right: Discharge end of the swing conveyor

Another excellent device used at the Kaiser pit is a portable boom conveyor for placing stripping in the pit. The boom is about 100 ft. long and throws the strip-pings far enough from the face so that the stripping piles cannot interfere with the working of the shovel. Tractors and scrapers and a 1½-yd. shovel are also used in stripping.

The cost of stripping and excavating is one of the heaviest in any sand and gravel production. In fact there are those authorities who say that the success or failure of an enterprise that has a good market depends on the cost of digging the material and getting it to the washing plant. The writer feels that every such technical advance as is shown in this operation is of vital importance to the industry. D. A. Rhodes is superintendent of operation at this plant.

National Sand and Gravel Association Directors to Meet

THE ANNUAL MEETING of the board of directors of the National Sand and Gravel Association has been called by President Harold V. Owens for June 5 and 6 at the Palmer House, Chicago, Ill. It will be an open meeting and all interested members of the association are invited. The announcement states:

"We recognize that the Code demands continuing attention and that its success is indispensable to the sand and gravel industry. Nevertheless, the industry must concern itself with a great many problems which are not embraced by the code, and it is this sphere of influence which the association occupies and which, if it neglects, the industry will be the loser. The sand and gravel industry should not be content, in our judgment, with the present division of the market for aggregates, and it should institute a vigorous campaign for the development of new uses for its products and their larger use in fields which they already reach.

"The association and the industry will be performing a public service by seeking constantly for wider markets for sand and gravel, and when it is realized that a great many of the normal outlets for our industry have been dormant for the last three years or more and must, sooner or later, express themselves in renewed demand, the need for intelligent planning on our part to take advantage of this situation, when it does present itself, is readily apparent. Our industry must know more about the uses to which its products are put and it must bring all pertinent facts to the attention of the consumer. If we fail to do this, and if we depend upon being benefited automatically from the revival of the construction industry, we shall probably find ourselves at a severe disadvantage.

"It is the function of the board of directors, under the constitution, to take the lead-

ership in directing the work of the association, and, for the reasons above recited, it is of more than ordinary importance that there should be a full representation at the Chicago meeting."

Portland Cement Yardage

AWARDS of concrete pavement for April, 1934, are announced by the Portland Cement Association as follows:

	Sq. yd.	Sq. yd.
	awarded during April, 1934.	awarded to date, April 28, 1934.
Roads	1,463,400	8,092,447
Streets	992,358	5,188,203
Alleys	3,693	38,967
Total	2,459,451	13,319,617

Cement

Statistics—The portland cement industry in April, 1934, according to the U. S. Bureau of Mines, produced 6,544,000 bbl., shipped 6,498,000 bbl. from the mills, and had in stock at the end of the month 21,468,000 bbl. Production of portland cement in April, 1934, showed an increase of 56.4% and shipments an increase of 31.3% as compared with April, 1933. Portland cement stocks at mills were 4.5% higher than a year ago. In the following statement of relation of production to capacity, the total output of finished cement is compared with the estimated capacity of 163 plants at the close of April, 1934, and of 164 plants at the close of April, 1933.

RATIO (PER CENT) OF PRODUCTION TO CAPACITY.

	April, 1933	April, 1934	March, 1934	Feb., 1934	Jan., 1934
The month ...	18.9	29.6	23.0	20.2	16.6
The 12 months ended	26.2	25.9	25.0	24.4	23.9

Crushed Stone Production in 1933

THE United States Bureau of Mines has released the following statistics:

TABLE 1—CRUSHED AND BROKEN STONE SOLD OR USED BY PRODUCERS IN THE UNITED STATES BY PRINCIPAL USERS, 1932-33, SHORT TONS

	1932	1933*	Gain or loss, %
Concrete and road metal	48,020,560	45,000,000	- 6
Railway ballast ..	3,974,540	5,000,000	+ 21
Cement manufacture	19,403,000	15,500,000	- 20
Lime manufacture ..	4,000,000	5,000,000	+ 25
Flux stone	3,991,160	8,500,000	+113
Alkali works	3,211,770	4,200,000	+ 31
Rip rap	3,462,290	4,000,000	+ 16
Agricultural lime-stone	910,430	1,000,000	+ 10
Refractory stone ..	197,430	400,000	+103
Asphalt filler	177,110	120,000	- 32
Calcium carbide ..	188,050	120,000	- 36
Other uses	4,690,080	5,500,000	+ 17
Total	92,223,420	94,340,000	+ 2
Rock asphalt	314,039	277,000	- 12
Slate granules and flour	209,750	187,000	- 11

*Subject to revision.

TABLE 2—DIRECT COMPARISON OF IDENTICAL QUARRIES, 1932-33

529 Quarries, All Classes			
	1932	1933	Gain or loss, %
Tons produced	44,598,794	48,806,289	+ 5.0
Total man-hours worked	45,302,377	42,612,629	- 6.0
Total man-shifts worked	5,384,822	5,669,606	+ 5.3
Total men employed	26,592	28,977	+ 9.0
Average days worked	202	196	- 3.3
Percentage of possible time worked*	67.5	65.3	- 3.3
Average number weeks worked† ..	35.1	34.0	- 3.3
Average hours worked per man ..	1,703	1,470	-13.7
Average hours worked per man per week†	48.5	43.2	-10.9
Average hours worked per shift	8.4	7.5	-10.9
Average tons per man-shift	8.28	8.26	- 0.6
Average tons per man-hour	0.98	1.10	+1.13
Average tons per man-year	1,677	1,615	- 3.7
119 Commercial Crushed Stone Quarries			
	1932	1933	Gain or loss, %
Tons produced	14,889,888	16,528,881	+11.1
Total man-hours worked	8,089,758	7,158,515	-11.5
Total man-shifts worked	913,252	917,617	+ 0.4
Total men employed	5,239	5,620	+ 7.2
Average days worked	174	163	- 6.3
Percentage of possible time worked* ..	58.0	54.4	- 6.3
Average number weeks worked† ..	30.2	28.3	- 6.3
Average hours worked per man ..	1,543	1,273	-17.5
Average hours worked per man per week† ..	51.1	45.0	-11.9
Average hours worked per shift	8.9	7.8	-11.9
Average tons per man-shift	16.32	18.0	+10.3
Average tons per man-hour	1.84	2.31	+25.6
Average tons per man-year	2,843	2,942	+ 3.4

*Three hundred days assumed possible.

†Represents the average number of full weeks worked and hours worked per man per week, assuming continuous operation; all operations, however, were subject to a certain amount of intermittent activity due both to weather conditions and to market factors.

Estimates shown for 1933 in Table 1 are computed from returns from producers for that year received up to May 1, 1934.

Reports from the field indicate that production from temporary and noncommercial plants again increased as did also truck shipment as compared to rail shipment.

The State of Pennsylvania again reported a large production (about 4,000,000 tons) of field stone to be used for road base.

Reports from 529 quarries of all classes representing 48.4% of the total crushed and broken stone production for 1932 and 51.8% for 1933 including 119 commercial crushed stone quarries, are presented in Table 2.

Modernization News

IN SUCH representative rock products states as Iowa and Illinois the trend in many plants is definitely toward substantial mechanical improvement of operations. This current modernization activity is to be noted in all main types of projects from sand and gravel to cement plants.

At Buffalo, Iowa, the Dewey Portland Cement Co. has installed natural gas burning equipment. Two of the three kilns at its Buffalo plant now are in operation, using the gas piped from the Southwest. New



One of two Dumptor units which have replaced dinkey line on stripping operation of Lincoln Sand and Gravel Co., Lincoln, Ill.

storage (see illustrations) also is being completed for its commercial crushed stone operation. A new Newhouse crushing unit has been ordered for installation in the storage structure so that new stone sizes specified in recent specifications for government work, may be produced.*

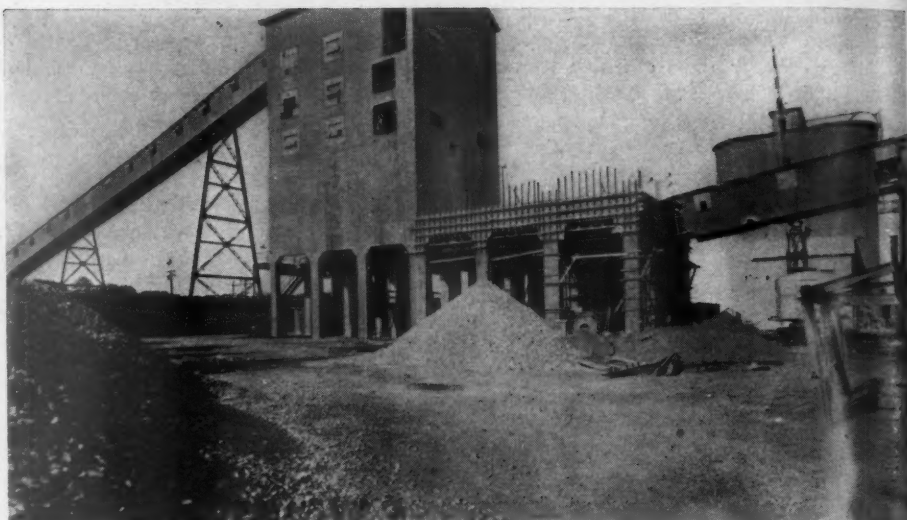
Among the new developments at the plant of the Lincoln Sand and Gravel Co., Lincoln, Ill., is installation of a triple-deck Simplicity vibrating screen to permit additional gravel separations.

The major improvement undertaken by this company during the present season, however, is purchase of heavy Dumptor units for stripping operations.

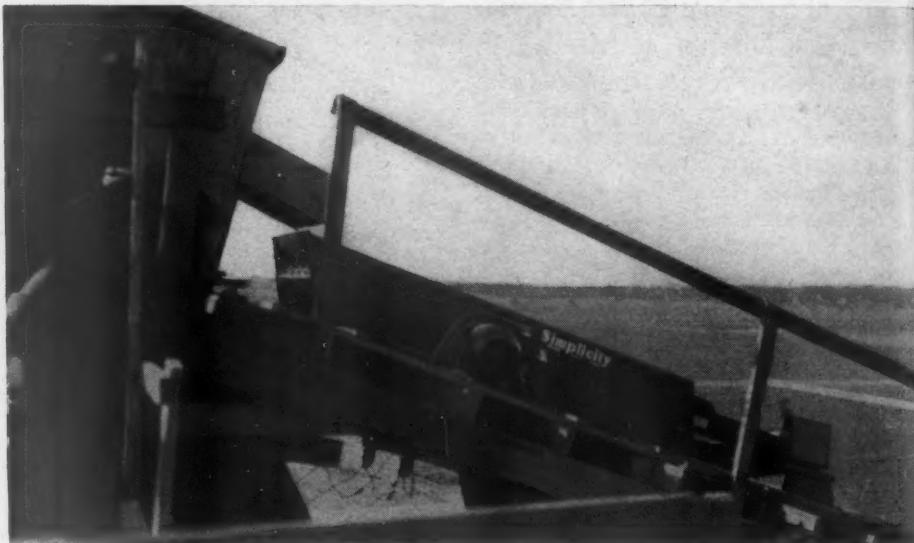
The old system involved use of considerable narrow gauge track and dinkey engine. According to V. O. Johnson, president of the Lincoln Sand and Gravel Co., the two new Dumptors, loaded by a clamshell bucket, move 50 per cent more material with three men than was handled over the dinkey line manned by nine workers. The appreciable daily saving in cost is expected soon to pay for the new equipment.

Each Dumptor, on which the driver is

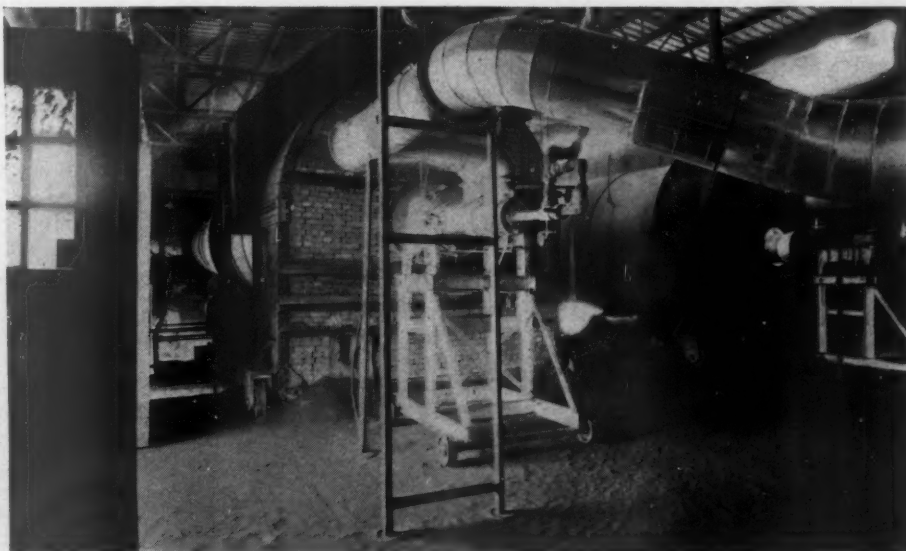
*An Illinois sand producer has just completed major additions to his plant to permit rapid production of new sand specification grades released for federal work. See complete details in July issue of Rock Products.



New crushing equipment will be housed in this recently begun commercial crushed stone storage unit of the Dewey Portland Cement Co., Buffalo, Iowa



Vibrating screen recently installed at plant of Lincoln Sand and Gravel Co., to furnish stock of gravel grades



View of two of the three kilns equipped with natural gas burning equipment in the plant of the Dewey Portland Cement Co., Buffalo, Iowa

seated behind the load, can be easily and quickly maneuvered over rough ground from loading point to the dumping area several

hundred feet away. Balance of these dumping units permits the shoving and "coaxing" of loads after dumping.

Editorial Comments

In the controversy being waged throughout the country over the merits of NRA, and the codes of fair competition

**Substance
More
Important
Than the
Letter**

for the various industries, we see a distinct and unmistakable tendency for industries to lean on their codes as a cure-all for every conceivable abuse. The codes are being continually amended, extended, interpreted, to cover violations of the spirit of the law, on the

theory that the codes are too loosely drawn. The intent is to plug every possible loophole.

When we stop to consider how the statutes of various states, as well as of the United States, in other words the criminal and civil codes of our organized society, have been rewritten and revised and revamped and interpreted by the courts, since our civil governments were established, we can realize the utter futility of ever "plugging all the loopholes." These codes have become so involved, and so full of loopholes, that the most wise and distinguished members of the bar are now advocating their rewriting for simplification and understanding.

Certainly business men who have so long derided legislatures, law makers, and lawyers, because of their law making proclivities, should be the last ones to fall into the same error. A multiplicity of laws and a mass of legal verbiage never lead to law enforcement and help no one but lawyers—lawyers of two kinds, one trying to interpret the law in the interests of the public welfare, the other kind trying to find all possible loopholes, the latter being, of course, in the great majority.

The common understanding of the National Industrial Recovery Act, and of the philosophy behind it, is that the law was drawn to promote business morality and decency, to render unlawful and punishable certain glaring breaches of common decency in competition for business and for profits. In their essence all these breaches of decency are the same in all industries and could be reduced to a code not much more complicated than the Ten Commandments. Such a code would be understandable by every member of an industry. Such a code would preserve the spirit of the law, by emphasizing that the real intent is a moral uplift, and not a particular method of attaining it.

It must be remembered, too, that the more specific the codes become, the more specific and limited must be their legal interpretation. For example, take a single illustration of the very common code provision against selling below cost. The perfectly obvious reason for this provision is the common-sense view that a producer or manufacturer must not be allowed to ruin an entire industry because he has no more brains, or sense of moral obligation, than to ruin himself or his own company in his desire to ruin his competitors.

If we accept that as the spirit and purpose of the law it is not important how he may go about it to find a loophole. However, when we attempt to define and prohibit all the ways he might find to get around the law, a court composed of lawyers would undoubtedly hold that those provisions limited and described the only things he was prohibited from doing. Since he had found another way, it would be held that he had not violated the law.

A producer, we will say, is offered \$2,500 for something that under the code he would have to ask \$3,000 for. However, he is satisfied with the \$2,500 offer. He says to the prospective buyer: "I'll not take less than the code price of \$3,000, but I'll bet you \$500 I can spit farther than you can," accompanying his sporting proposition with a knowing wink. The prospective purchaser, unless he is very dumb, accepts the challenge and spits first. He wins his bet, and \$500 is paid over, and he places his order at \$3,000.

No matter how detailed a code is drawn there is no violation of the letter of the law, which says nothing about sporting propositions, and both producer and buyer would probably think themselves very smart. That may be an extreme illustration, although we are told it is actually an example of how at least one code is being violated.

The point, of course, is that the tighter one attempts to make a code the more fun, or profit, a certain type of twisted mentality gets in finding ways to get around it. And legal experience without end shows that adding details to a simple prohibition does not help either its understanding or its enforcement.

We must, either now or eventually, get back to the oft-repeated original premise that NIRA and the codes of fair competition never can be *enforced* in all their ramifications. For every loophole that is plugged there will be two new ones opened up.

The NRA has been ordered by the President to abandon attempts to enforce the codes of the so-called small service industries, the dry cleaners, barbers, etc. If public sentiment is strong enough they will be enforced locally, otherwise they will go by the board. Sooner or later the President will have to accept the same logic in the administration of the codes of all industry. Except for hours of labor and rates of wages which directly affect large sections of the public as well as industrialists, he will eventually have to take the position that if there is not enough public sentiment, and enough common sense in industry, to bring about observance of provisions against unethical and unfair business practices, even the power of the United States Government can not save private business from itself. For only God Almighty can do it, by giving individual business men enough moral fibre to save themselves.

Recent Quotations on Rock Products Securities

Stock	Date	Bid	Asked	Dividend	Stock	Date	Bid	Asked	Dividend
Allentown P. C., com. ⁴⁷	5-26-34	4 1/2	5 1/2		McCready-Rodgers, 7% pfd. ⁴⁷	5-26-34	45	50	
Allentown P. C., pfd. ⁴⁷	5-26-34	5	6 1/2		Medusa P. C., com. ⁴⁷	5-26-34	10	12	
Alpha P. C., com. ⁴⁷	5-26-34	13 1/2	14		Medusa P. C., pfd. ⁴⁷	5-26-34	40	45	
Alpha P. C., pfd. ⁴⁷	5-26-34	85	90	\$1.75 qu. Mar. 15, '34	Michigan L. and O., com. ⁴⁷	5-26-34	65	70	
Amalgamated Phos. 6's, '36 ⁴⁷	5-26-34	97	100		Missouri P. C., com. ⁴⁷	5-26-34	80	90	2% Mar. 15, '34
American Aggregates, com. ⁴⁸	5-12-34	1 1/2	2 1/2		Monarch Cement, com. ⁴⁷	5-26-34	2 1/2	3	25c Mar. 10, '34
American Aggregates, pfd. ⁴⁸	5-12-34	5	15		Monolith P. C., com. ⁴⁷	5-15-34	13 1/2	15	
American Aggrs., 6's, '43, old ⁴⁸	5-12-34	38 & int	42		Monolith P. C., units ⁴⁷	5-15-34	83	88	
American L. and S., 1st 7's ⁴⁸	5-12-34	36F	40F		Monolith Portland, Midwest ⁹	5-15-34	1/4	1/2	
Arundel Corp., com. ⁴⁸	5-12-34	16	18	25c qu. Apr. 2, '34	National Cem. (Can.), 1st 7's ⁴⁸	5-12-34	95	subject	
Bessemer L. and O., Class A ⁴⁷	5-12-34	..	3		National Gypsum A., com. ⁴⁷	5-26-34	7 1/2	8 1/2	
Bessemer L. and O., 1st 6 1/2's, 1947 ⁴⁸	5-12-34	20F	....		National Gypsum, pfd. ⁴⁷	5-26-34	78	80	
Bessemer L. and O., cert. of dep., 1947 ⁴⁸	5-26-34	30	....		National Gypsum 6's ⁴⁷	5-26-34	85	90	
Bloomington Limestone 6's ⁴⁷	5-26-34	8	10		National L. & S., 6 1/2's, 1941 ⁴⁷	5-26-34	75	80	
Boston S. and G., new com. ⁴⁷	5-12-34	1	2		Nazareth Cement, com. ⁴⁷	5-26-34	4	7	
Boston S. and G., new 7% pfd. ⁴⁷	5-12-34	5	10		Nazareth Cement, pfd. ⁴⁷	5-26-34	25	35	
Boston S. and G., 7's, 1934 ⁴⁷	5-12-34	50	....		Newaygo P. C., 1st 6 1/2's, 1938 ⁴⁸	5-26-34	50	....
California Art Tile, A ⁹	5-15-34	1	2 1/2		New England Lime 6's, '35 ⁴⁸	5-10-34	..	10 (nominal)	
California Art Tile, B ⁹	5-15-34	..	1 1/2		N. Y. Trap Rock 1st 6's, 1946 ⁹	5-26-34	57	actual sale	
Calaveras Cement, com. ⁴⁷	5-24-34	1 1/2	1 1/2		N. Y. Trap Rock, 7% pfd. ⁴⁸	5-26-34	7	subject	
Calaveras Cement, 7% pfd. ⁴⁷	4-12-34	47 1/2	75	1.75 qu. Jan. 15, '34	North Amer. Cement 1st 6 1/2's ⁴⁷	5-26-34	20	25	
Canada Cement, com. ⁴⁷	5-26-34	7 1/2	7 1/2		North Amer. Cement, com. ⁴⁷	5-26-34	1	2	
Canada Cement, pfd. ⁴⁷	5-26-34	41 1/2	actual sale		North Amer. Cement, 7% pfd. ⁴⁷	5-26-34	2	4	
Canada Cement, 6 1/2's, 1947 ⁴⁸	5-22-34	93	96		North Shore Mat. 1st 6's ⁴⁷	5-26-34	50	55	
Canada Crushed Stone bonds ⁴⁸	5-12-34	70	subject		Northwestern States P. O. ⁴⁷	5-26-34	58	....	\$1.50 Jan. 2, '34
Canada Crushed Stone, com. ⁴⁸	5-12-34	5	subject		Northwestern Port. Cem., units ⁹	5-15-34	37	40	
Certainite Products, com. ⁴⁷	5-26-34	5 1/2	6 1/2		Ohio River S. and G., com. ⁴⁷	5-26-34	..	5	
Certainite Products, pfd. ⁴⁷	5-26-34	28	31		Ohio River S. and G., 1st pfd. ⁴⁷	5-26-34	26	....
Certainite Products, 5 1/2's, '48 ⁴⁷	5-26-34	64	actual sale		Ohio River S. and G., 2d pfd. ⁴⁷	5-26-34	..	20	
Cleveland Quarries	5-26-34	5	10		Ohio River S. and G., 6's ⁴⁸	5-26-34	6F	....
Consol. Cement, 1st 6 1/2's, '41 ⁴⁷	5-26-34	21	23		Oregon P. C., com. ⁴⁷	5-26-34	5	10	
Consolidated Cement, pfd. ⁴⁷	5-26-34	1	2		Oregon P. C., pfd. ⁴⁷	5-26-34	40	50	
Consolidated Oka S. and G. (Canada) 6 1/2's ⁴⁸	5-12-34	20	....		Pacific Coast Aggr., com. ⁴⁰	5-14-34	..	10c	
Consol. Rock Prod., com. ⁴⁷	5-26-34	1 1/2	1		Pacific Coast Aggr., pfd. ⁴⁰	5-14-34	..	15c	
Consol. Rock Prod., pfd. ⁴⁷	5-26-34	1	2		Pac. Coast Aggr., 6 1/2's, '44 ⁴⁰	5-14-34	18	20F	
Consol. Rock Prod., units ⁴⁷	5-26-34	2	3		Pacific Coast Aggrs., 7's, '39 ⁴⁰	5-14-34	2	5F	
Construction Mat., com. ⁴⁷	5-26-34	1	2		Pacific Coast Cement 6's, '37 ⁴⁰	5-14-34	49	51	
Construction Mat., pfd. ⁴⁷	5-26-34	2	4		Pacific P. C., com. ⁴⁰	5-14-34	4	5	
Consumers Rock & Gravel, 1st Mtg. 6 1/2's, '48 ⁴⁷	5-26-34	30	35		Pacific P. C., pfd. ⁴⁰	5-14-34	34	38	
Cooza P. C., 1st 6's ⁴⁷	5-26-34	15	20		Pacific P. C. 6's, '35 ⁴⁰	5-14-34	97	100	
Coplay Cement Mfg., pfd. ⁴⁷	5-26-34	6	8		Pacific P. C. 6 1/2's, pfd. ⁴⁰	5-7-34	30	35	
Coplay Cement Mfg., 6's, '41 ⁴⁷	5-26-34	45	50		Peerless Cement, com. ⁴⁷	5-26-34	..	1 1/2	
Dewey P. C., com. ⁴⁷	5-26-34	70	80		Peerless Cement, pfd. ⁴⁷	5-26-34	1	2	
Dolese and Shepard.....	5-26-34	10 1/2	11 1/2		Penn. Dixie Cement, com. ⁴⁷	5-26-34	4 1/2	4 1/2	
Dufferin Pav. & Cr. Stone, com. ⁴⁷	5-21-34	3	actual sale		Penn. Dixie Cement, pfd. ⁴⁷	5-26-34	20 1/2	23 1/2	
Dufferin Pav. & Cr. Stone, pfd. ⁴⁷	5-21-34	30	actual sale		Penn. Dixie Cement, 6's A, '41 ⁴⁷	5-26-34	72 1/2	actual sale	
Edison P. C., com. ⁴⁷	5-26-34	1	2		Penn. Glass Sand Corp., pfd. ⁴⁷	5-26-34	70	75	\$1.75 Apr. 1, '34
Edison P. C., pfd. ⁴⁷	5-26-34	2	4		Penn. Glass Sand Corp., 6's ⁴⁷	5-26-34	97	100	
Federal P. C. 6 1/2's, 1941 ⁴⁷	5-26-34	30	33		Petoskey P. C., 6's, '41 ⁴⁸	5-12-34	42	....
Florida Port. Cement 6 1/2's, '37 ⁴⁸	5-26-34	73	....		Petoskey P. C., 6's, 1935-'38 ⁴⁸	5-12-34	45	....
Florida Port. Cement Units ⁴⁷	5-26-34	5	6 1/2		Petoskey P. C., com. ⁴⁷	5-26-34	1 1/2	2 1/2	
Giant P. C., com. ⁴⁷	5-26-34	2	4		Port Stockton Cem., com. ⁹	5-15-34	No market	....
Giant P. C., pfd. ⁴⁷	5-26-34	14	17		Republic P. C., 6's, 1943 ⁴⁷	5-26-34	65	70	
Gyp. Lime & Alabastine, Ltd. ⁴⁷	5-26-34	6	6 1/2		Riverside Cement, A ⁹	5-15-34	7 1/2	8 1/2	20c May 1, '34
Gyp. Lime & Alabastine 5 1/2's, 1948 ⁴⁷	5-22-34	81	84		Riverside Cement, B ⁹	5-15-34	1	2	\$1.50 qu. May 1, '34
Hermitage Cement, com. ⁴⁷	5-26-34	10	15		Riverside Cement, pfd. ⁹	5-15-34	82	84	
Hermitage Cement, pfd. ⁴⁷	5-26-34	42	50		Rockland and Rockport Lime, 1st pfd. ⁴⁷	5-26-34	2	3	
Ideal Cement 5's, 1943 ⁴⁷	5-26-34	100	102		Sandusky Cement 6's ⁴⁷	5-26-34	55	65	
Ideal Cement, com. ⁴⁷	5-26-34	30	34	25c qu. Apr. 2, '34	Sandusky Cement 6 1/2's, 1932-1937 ⁴⁷	5-26-34	55	65	
Indiana Limestone 6's ⁴⁷	5-26-34	15	18		Santa Cruz P. C., com. ⁹	5-15-34	50	53	\$1.00 qu. Apr. 1, '34
International Cement bonds, 5's, 1948 ⁴⁷	5-26-34	91 1/2	actual sale		Schumacher Wallboard, com. ⁴⁷	5-26-34	1	3	
International Cement, com. ⁴⁷	5-14-34	23	23 1/2		Schumacher Wallboard, pfd. ⁹	5-15-34	1 1/2	3	
Kelley Island L. and T. ⁴⁷	5-26-34	11 1/2	12	15c qu. Apr. 1, '34	Signal Mt. P. C., com. ⁴⁷	5-26-34	2	3	
Ky. Cons. Stone, 6 1/2's, 1933 ⁴⁷	5-26-34	5	6		Signal Mt. P. C., pfd. ⁴⁷	5-1-34	15	18	
Ky. Cons. Stone, com. ⁴⁷	5-26-34	1	2		Signal Mt. P. C., 6's, '36 ⁴⁷	5-26-34	85	....
Ky. Cons. Stone, pfd. ⁴⁷	5-26-34	3	5		Southwestern P. C., units ⁴⁰	5-14-34	100	150	
Ky. Cons. Stone, 7% pfd. ⁴⁷	5-26-34	7 1/2	....		Standard Paving & Mat. (Canada), com. ⁴⁷	5-21-34	3	actual sale	
Ky. Cons. Stone, 1st Mtg. 6 1/2's ⁴⁸	5-26-34	1	2		Standard Paving & Mat., pfd. ⁴⁷	5-21-34	21	actual sale	
Ky. Cons. St. V. T. C. ⁴⁷	5-26-34	1 1/2F	....		Superior P. C., A ⁴⁰	5-14-34	25	27	55c May 1, '34
Ky. Rock Asphalt, com. ⁴⁸	5-26-34	6	8		Superior P. C., B ⁴⁰	5-14-34	6	8	55c May 1, '34
Ky. Rock Asphalt, pfd. ⁴⁸	5-26-34	..	58		Trinity P. C., units ⁴⁷	5-26-34	20	25	
Ky. Rock Asphalt 6 1/2's, '35 ⁴⁷	5-26-34	..	1/2		Trinity P. C., com. ⁴⁷	5-26-34	5	10	
Kentucky Stone, com. ⁴⁷	5-26-34	..	6		Trinity P. C., pfd. ⁴⁷	5-26-34	18	22	
Kentucky Stone, pfd. ⁴⁷	5-26-34	..	6		U. S. Gypsum, com. ⁴⁷	5-26-34	36 1/2	37 1/2	25c qu. July 2, '34
Lawrence P. C. ⁴⁷	5-26-34	12	15		U. S. Gypsum, pfd. ⁴⁷	5-26-34	130	132	1.75 qu. July 2, '34
Lawrence P. C., 5 1/2's, 1942 ⁴⁷	5-26-34	73	76		Wabash P. C. ⁴⁷	5-26-34	7 1/2	10	
Lehigh P. C., com. ⁴⁷	5-26-34	13	14 1/2		Warner Co., ww, 1st 6's ⁴⁷	5-26-34	25	35	
Lehigh P. C., pfd. ⁴⁷	5-26-34	74 1/2	77	87 1/2c qu. Apr. 2, '34	Warner Co., ex.w., 1st 6's ⁴⁷	5-26-34	25	35	
Louisville Cement ⁴⁷	5-26-34	70	75		Warner Co., com. (sold at auction Philadelphia).....	3-7-34	2 1/2	actual sale	
Lyman-Richey 1st 6's, 1935 ⁴⁷	5-26-34	95	100		Warner Co., pfd. (sold at auction Philadelphia).....	3-7-34	7 1/2	actual sale	
Marbelite Corp., com. (cement products) ⁴⁸	5-14-34	7 1/2c	....		Whitehall Cem. Mfg., com. ⁴⁷	5-26-34	35	45	
Marbelite Corp., pfd. ⁴⁸	5-14-34	60c	....		Whitehall Cem. Mfg., pfd. ⁴⁷	5-26-34	50	55	
Marquette Cement, com. ⁴⁷	5-26-34	14	16		Wisconsin L. & C., 1st 6's, '33 ⁴⁷	5-26-34	95	100	
Marquette Cement, pfd. ⁴⁷	5-26-34	50	55		Wisconsin L. & C. 6 1/2's ⁴⁷	5-26-34	95	100	
Marquette Cem. Mfg. 1st 5's, 1938 ⁴⁷	5-26-34	80	90		Wolverine P. C., com. ⁴⁷	5-26-34	1	2	
Marquette Cem. Mfg. 1st 6's, 1935 ⁴⁸	5-26-34	97	....		Yosemite P. C., A, com. ⁴⁶	5-26-34	1	subject	
Material Service Corp. ⁴⁷	5-26-34	4	6						
McCready-Rodgers, com. ⁴⁷	5-26-34	7	10						

Quotations by: *A. E. White Co., San Francisco, Calif. ¹²James Richardson & Sons, Ltd., Winnipeg, Man. ¹⁴First Wisconsin Co., Milwaukee, Wis. ¹⁷Wise Hobbs & Arnold, Boston. ⁴⁰Martin Judge, Jr., and Co., San Francisco, Calif. ⁴²Nesbitt, Thompson & Co., Toronto. ⁴⁶First National Bank of Chicago, Chicago, Ill. ⁴⁷Anderson Plots and Co., Chicago, Ill. ⁴⁸Hewitt, Ladin & Co., New York, N. Y.

F—Flat. †The payment is on arrears and leaves accumulated unpaid dividends of \$1.92 1/2 a share.

American Aggregates Corp., Greenville, Ohio, reports for the year ended December 31, 1933: Tonnage production in 1933 was about 25% less than in 1932, reaching an all-time low of 17% of demonstrated plant capacity. Net sales declined from \$903,791.12 in 1932 to \$696,269.63 in 1933. Operations for the twelve months ended December 31, 1933 resulted in a net loss of \$330,788.07 as compared with a net loss of \$524,586.69 for the previous twelve-month period. Included in the above mentioned net loss for 1933 are depreciation and depletion charges taken during the year in the amount of \$325,515.16.

The comparatively favorable showing for 1933 resulted from economies in operation and administration. Controllable production costs decreased 1½c per unit of production despite the further appreciable shrinkage of tonnage and increased labor costs occasioned by the rising trend in wage levels. Moreover, administration, selling and general expense decreased approximately 50% during 1933, reflecting the results of the policy of retrenchment inaugurated in prior years as well as an improvement in the collectability of newly created accounts receivable.

For the purpose of absorbing excess personnel and in order to utilize equipment not presently required in the sand and gravel operations, the corporation has embarked upon a conservative program of contract work. Three dredge boats are now engaged in prosecuting dredging projects of the Federal Government in the Ohio, Illinois and Wolf Rivers. An earth moving contract in West Virginia is being carried out by a wholly owned subsidiary.

During 1933 a plan of capital reorganization of the corporation was consummated. First mortgage income bonds were offered in exchange for the outstanding debentures of the corporation and at December 31, 1933, first mortgage bonds of the par value of \$853,000 had been issued in exchange for a like amount of debentures. It is believed that within the near future, the major portion of the remaining outstanding debentures will be exchanged for first mortgage bonds. This adjustment of the funded debt of the corporation has materially decreased the fixed charges thereon, which constituted a continuing threat to the corporation's existence.

The plan of reorganization likewise provided for the creation of a new issue of non-cumulative preferred stock which was exchanged on a share for share basis for the issued and outstanding cumulative preferred stock. In addition, there was issued to the preferred shareholders one share of treasury common stock for each share of preferred stock outstanding in satisfaction and discharge of the accumulated and unpaid dividends on the original preferred stock. As further consideration for their concurrence in the plan of reorganization, the preferred shareholders were given the right, represented by stock purchase warrants, to purchase additional common stock equal in

amount to the shares of preferred stock owned.

All indications point to improved business conditions for the corporation during 1934. The public works program of the Federal Government is now well under way and should provide a larger market for the products of the corporation. Ballast purchases by railroads will in all probability materially exceed the ballast purchases of 1933. On the contrary, it is not anticipated that private building will be of any consequence. The prosecution of contract work should likewise provide a profitable means to utilize idle equipment of the corporation.

AMERICAN AGGREGATES CORPORATION AND SUBSIDIARIES.

(Consolidated Profit and Loss Account and Summary of Deficit Account for the Year Ended December 31, 1933)

Gravel plants and yards— Net sales (after deducting allowances, trade and cash discounts, etc.)	\$696,269.63	
Cost of sales	550,991.35	
Gross profit on sales—Before depreciation and depletion ..	\$145,278.28	
Loss from allied operations	6,334.23	
	\$138,944.05	
Selling, administrative and general expense	104,277.51	
Net Profit before interest earned and interest paid and depreciation and depletion ..	\$ 34,666.54	
Interest earned and miscellaneous income	49,762.70	
	\$ 84,429.24	
Interest paid on real estate obligations and amortization of bond discount and expense ..	29,178.65	
Net profit before interest on first mortgage bonds and depreciation and depletion ..	55,250.59	
Interest on first mortgage bonds ..	60,523.50	
	\$ 5,272.91	
Depreciation and depletion	325,515.16	
Net Loss carried to deficit account	\$330,788.07	

SUMMARY OF DEFICIT ACCOUNT

Balance surplus—January 1, 1933 ..	\$262,557.02	
Deduct—Adjustment of mortgage notes receivable	69,016.65	
	\$193,540.37	
Deduct—Net loss for the year ended—December 31, 1933	330,788.07	
Balance deficit—December 31, 1933	\$137,247.70	

AMERICAN AGGREGATES CORPORATION AND SUBSIDIARIES

(Consolidated Balance Sheet—December 31, 1933)

Assets		
Current assets:		
Cash	\$ 19,979.11	
U. S. Treasury certificates	40,714.90	
Municipal bonds	1,000.00	
Accounts and notes receivable— Customers— Accounts	\$153,892.89	
Notes	52,979.50	
Other receivables ..	28,924.21	
	\$235,796.60	
Less—Reserve for bad debts	92,813.73	142,982.87
Inventories—certified by the management as to quantities, condition and pricing (cost or market, whichever lower) Stock piles, manufacturing materials, etc.	112,468.63	
Total current assets	\$ 317,145.51	
Prepaid insurance and royalties ..	13,773.11	
Mortgage notes receivable Due serially from Jan. 1, 1935 to 1943	\$500,000.00	
Accrued income interest	15,000.00	515,000.00
Investments, advances, etc. Investment in American Materials Corp. (50% owned)	\$140,059.15	

Investment in Permanent Concrete Products, Inc. (58.07% owned)	108,778.39	
Advances for railroad right of way—refundable	8,442.48	
Notes and accounts of stockholders and employees (less reserve)	1,077.66	
Notes and accounts receivable other than current (less reserve)	1,427.88	
Miscellaneous investments	33,111.14	292,896.70

Plant and equipment Gross book value ..	\$6,542,143.62	
Less—Reserve for depreciation	2,279,246.47	4,262,897.15

Deferred charges Unamortized bond discount and expense	\$ 119,541.85	
Unamortized cost of franchise, right of way, etc.	160,838.01	280,379.86
		\$5,682,092.33

AMERICAN AGGREGATES CORPORATION AND SUBSIDIARIES

(Consolidated Balance Sheet—December 31, 1933)

Liabilities		
Current liabilities		
Real estate purchase contracts due in 1934	\$ 32,522.33	
Notes payable due in 1934	13,300.00	
Accounts payable	52,615.23	
Reserve for Federal income tax (subject to final review by Treasury Department)	11,983.32	
Accrued taxes, interest, royalties, etc.	66,457.34	
Total current liabilities	\$ 176,878.22	
Deferred liabilities		
Real estate purchase contracts due 1935-1937	\$ 95,175.00	
Notes payable due 1935 and 1936	20,000.00	
Accrued income interest on First mortgage bonds ..	27,733.75	142,908.75
First mortgage bonds—due February 1, 1943 Authorized	\$1,500,000.00	
Issued	\$1,081,000.00	
Treasury bonds hypothecated	228,000.00	
Exchanged for sinking fund debentures	853,000.00	
Fifteen year 6% sinking fund gold debentures, Series "A," due February 1, 1943 Authorized and issued	\$2,000,000.00	
Less—Redeemed ..	982,500.00	
	\$1,017,500.00	
Exchanged for first mortgage bonds ..	853,000.00	164,500.00
Capital stock and surplus		
Capital stock— Preferred—7% non cumulative Authorized 25,000 shares par value \$100 each Issued — 24,684 shares	\$2,468,400.00	
Less in treasury — 6,533 shares ..	653,300.00	
Less repurchase contract — 300 shares	30,000.00	
	\$1,785,100.00	
Common—without par value— Authorized 350,000 shares (of which 59,815 shares are reserved for the exercise of outstanding Stock Purchase Warrants and options) Issued — 227,345 shares	\$2,273,450.00	
Less in treasury — 21,767 shares ..	217,670.00	
	\$2,055,780.00	
Capital surplus	641,173.06	
Deficit	137,247.70	4,344,805.36
		\$5,682,092.33

Grinding Gypsum

With Particular Reference to Quality, and Tube-Mill Re-Grinding

By A. M. Turner,

Supervisor of Plaster Quality, Three Forks Portland Cement Co., Hanover, Mont.

AS MAY BE SAID about most phases of the gypsum industry, literature relative to the subject of grinding is most scarce. Manufacturers of pulverizers and some research men have made public facts about grinding costs and capacities of machines, but frankly admit that the effect of grinding upon quality is a subject about which they have little or no information.

From a standpoint of power consumption it may be safely said that in gypsum plants operating machinery for mining, crushing, grinding, calcining, mixing and packing units, the power required for grinding amounts to 40 to 50% of the total energy used. At one typical gypsum mill where the power cost for grinding was studied, the figures showed that the power required for this unit amounted to 45 to 48% of the total.

Conditions Preliminary to Grinding

There are many conditions preliminary to grinding which affect the process of reducing the raw material to a powder. For instance, the raw material may be in the form of an earthy substance, sand of various sizes, soft granular rock, hard gypsum, or may contain foreign materials such as lime, shale, or anhydrite harder than the gypsum itself, which also has to be ground. Naturally these conditions will have to determine to a large extent the type of equipment which will be most suitable for the particular operation and the results to be obtained.

The smooth progress of grinding may be seriously impaired by the presence of free moisture in the material to be milled. In fact it is a general rule that 1½% or more free moisture in gypsum usually sooner or later causes a grinding hazard. Naturally the remedy for such cases is to use some form of drying before milling the rock. However, strange as it may seem, highly trained and experienced engineers in recent years have built plants and omitted a drying unit when the gypsum to be handled was too wet to grind satisfactorily. The natural result, of course, was to later piece on to the finished plant and install a dryer which should have fitted into the normal flow of material.

Gypsite, the earthy form of gypsum, usually is not ground prior to calcination, but after the cooking process the coarse material is screened out and ground or discarded. However, a problem occasionally develops on account of natural hard gypsite lumps or those caused by freezing in cold climates. Consequently crushing and even some grinding may be required.

The type of primary and secondary crush-

ing may have some effect, but this factor as well as those previously mentioned are individual problems, which can best be solved when occasion arises. They are merely mentioned now to show that conditions preliminary to grinding are something not to be taken too lightly.

Types of Grinding Equipment

1. Mill stones, Buhr mills, Emery stones.
2. Hammer mills.
3. Ring roller mills.
4. Tube mills.
5. Modification or combination of above.
6. Air separators.
7. Screening equipment.

The above types of machines represent equipment which will be discussed in the following paragraphs.

Economics of Grinding

As stated under the heading, "Conditions Preliminary to Grinding," it may readily be seen that the cost of this operation will be influenced considerably by various natural factors over which the operator has no control. Another consideration is the calcining process which is used for cooking the raw material. Naturally gypsum prepared for kettles and that used for rotary calciners presents two different problems, and different equipment would have to be considered accordingly.

Some gypsum plants operate under a purchase power contract which specifies a maximum demand, or a peak load penalty. In such cases it may be possible to stagger the operation of the various mechanical equipment in such a way that there will be surplus power available for grinding. This being the case the grinding equipment to use will not be selected so much by the power required for its operation as by the quality product produced. In other cases where the contract specifies no maximum demand, but the cost of power depends directly on current consumption, the quality and cost factors have to be combined and balanced to the best advantage.

After examining statistics and figures compiled by machinery manufacturers and gypsum producers, it seemed apparent that to give comparative production and power consumption figures on an equal basis for each type of grinding machine would be impossible. The reason for this confusion is due to the fact that the various equipment was tested or applied under conditions which varied in so many respects that any form of unification for comparison would be misleading. However, by taking an average

of the many figures at hand the following generalities should bear out in most instances.

The ring roller type mill is most generally favored for initial grinding (grinding before calcination) on a basis of high production per horse power hour. Where one stage grinding is in practice this type of mill is very highly recommended.

If for no other reason than historical significance, mill stones would deserve all the discussion devoted to them. There is something picturesque about the history of less than a century ago describing the grist mills with their mill stones and water wheels. Not longer than a decade ago this type of mill, without doubt, led all other types of grinding which was employed in the gypsum industry. At present a manufacturer of buhr mills makes the assertion that their use is so rapidly becoming obsolete that they have discontinued their manufacture. This manufacturer attributes the decline in their use largely to the fact that men who are good stone dressers have almost become a thing of the past. As the efficiency of these mills is only as good as the condition in which the stones are kept, it can readily be seen what the art of stone dressing meant to the history of these mills.

However, there are numerous favorable features of mill stone grinding. The fact that these mills are usually operated in a battery of separate units offers a flexibility to the grinding process which is an advantage. Then, being able to regulate the fineness to which the rock is pulverized is a distinct advantage which will later be discussed as a quality factor.

Little can be said against the hammer mill as an efficient machine for the function it is designed to perform. The hammer mill is not ordinarily employed for the final fine grinding of the finished product, but serves as an intermediate reducing machine. It has been employed extensively to reduce the coarse product of the rotary calciner prior to its introduction into the tube mill where it receives its final treatment.

From a theoretical standpoint the ideal plan for reduction would be accomplished by a combination of units such as the following, which has worked out to practical satisfaction: The crushed gypsum is fed to hammer mills where it is ground and then passed through air separators. The fine material from the separators is ready for calcination and the coarse rock is reduced by buhr stones. Some combinations for reduction employ the use of screens to

separate the various size materials and each size is used for some particular product.

About the time the mill stone began to pass out of the picture the tube mill made its entrance, and now it begins to look as if it had come to stay. It is classified as a regrinding agent, but in reality it is not its ability as a regrinding machine to which it owes its place in the industry, but rather the fact that its manner of regrinding develops greater plasticity in the plaster, which is a quality demanded by the trade. By comparison with other regrinding, tube milling is an expensive operation.

Mill stones go hand in hand with the tube mill as regrinding (grinding after calcination) machines. The ring roller mills are also employed to a minor extent.

Effect of Grinding on Quality

Mill stones as initial grinding equipment have one particular disadvantage due to the fact that they will not stay in sufficiently accurate adjustment to maintain a uniform fineness in the product. Frequent tests of the grind must be made to control it within reasonable limits. In secondary grinding (regrinding) the same objection holds true. However, the fact that these mill stones can be easily adjusted is an important quality asset, as the fineness can be controlled according to the product desired. For instance, gauging plaster, hardwall plaster, moulding plaster, and dental plaster all require a different fineness, all of which can be obtained very easily on this one mill. Most other types of mills do not have this desirable feature.

Regrinding plaster through a buhr mill improves the working qualities of the plaster, but does not begin to give it the increased plasticity of tube milling.

The ring roller type mills excel in producing a product of uniform fineness. Practically it can be said that these mills will operate year in and year out without 1% variation in the fineness of the material they discharge. However, on account of the principle of operation of these mills the gypsum is ground to particles which are all rather uniform in size as compared to the product from certain other types of grinding, and the product does not have the desirable superfines produced in tube mill grinding, for instance.

The roller mill gypsum is sometimes referred to as a sandy product which lacks plasticity. Nevertheless, in single stage grinding where the initial grind before calcination is the final grind, the ring roller mill has many advantages and the gypsum from these mills when calcined produces a plaster with excellent strength, high consistency and sand carrying capacity, and as set plaster on a wall can hardly be surpassed. However, plasticity is lacking, an obstacle that is hard to overcome among the plasterers themselves.

Where any combination types of grinding methods are used the quality of the product

produced will probably prove comparatively satisfactory although there seems no particular reason why it should be outstandingly good.

The tube mill has been used to a certain extent for initial grinding, but present indications are that this machine has not been generally accepted for this purpose; consequently the tube mill will be discussed in detail under regrinding.

Regrinding

Generally speaking, in the process of making wall plaster the gypsum goes through an initial grinding stage, is then calcined and reground before being mixed with hair and retarder and sacked for shipment. There are a few striking examples where regrinding is not practiced and the manufacturers contend that there is little if anything to be gained by a secondary reducing process. It is possible that in some locations regrinding is not desirable. The character of the gypsum rock could be such that its natural plasticity would be sufficient to make regrinding unnecessary. As a matter of fact, gypsite normally makes a very plastic product which never meets with complaint from this source.

However, we will deal with the gypsums which will become more plastic with regrinding and these without question are in the large majority. Any secondary grinding seems to improve the working qualities of plaster, but the tube mill has made by far the greatest strides in recent years toward accomplishing this work and will here be described in detail.

The milling produces a plaster much lighter per cubic foot than most plasters, which has a very high plasticity. The first feature, that is, light weight and greater volume, is desirable in wall plaster because it will carry more sand and cover a greater area of wall surface. Plasticity is a quality demanded by the men who are putting the material on the wall, as this feature makes it easier to apply and makes a better looking job. A plastic plaster will make a much nicer looking sand float finish wall than can be produced with a non-plastic material.

Some claim has been made to the effect that tube mill plaster will keep longer than that made by other processes. From various experiments made by the author it seems that any truth there may be in this statement is on account of the bulkiness of the material. The bulkier the plaster when old the more water and the more sand it will carry and this characteristic favors the tube mill material. On the other hand, tests prove that the consistency (water carrying capacity) of tube mill plaster has a natural decline with age the same as other plasters. This fact rather discredits the claims made for its better aging qualities in this respect. The factor which probably plays the most influential part in the favorable claims made about the aged plaster is the fact that it retains its plasticity.

Tube-mill ground material cannot be sat-

isfactorily sieved by the method ordinarily applied for screening. The material, instead of passing through the meshes, rolls up in little soft balls. These balls are composed of very fine particles which were doubtlessly ground to a fineness that would pass the size sieve on which the balls roll about. On account of this feature just mentioned the measure of the product under discussion is by the percent of these so-called tube mill balls which remain on the screen. (Usually a 40- or 60-mesh screen is used for these tests.)

The reason why tube milling produces these desirable results is a subject of much speculation and difference of opinion. Ordinarily the subject is passed by with the statement that this grinding develops sufficient gypsum flour or superfines to produce the desired creamy consistency in the plaster. As there seems to be considerably more behind this subject than above mentioned the following theories may well be advanced at this time.

On page 450 of the Iowa Geological Survey, Volume 28, on Gypsum, Mr. Emely's patent for plastic gypsum reads as follows:

If calcined gypsum is ground after calcination, one of two things may occur: If the grinding is not severe, the crystals will be reduced in size, but the sandy or non-plastic nature of the material will still remain. If the grinding is very severe, a chemical change can be made to occur, the water being actually ground out of the material. In actual practice, a buhr mill or tube mill is used for this grinding, and any water which is liberated is evaporated and carried off by the current of air passing through the mill. The resultant product is known as "soluble anhydrite."

This is anhydrous calcium sulphate, but it differs from the naturally occurring anhydrite in that it has a great affinity for water. So great is this affinity that a few moments' exposure to moist air is sufficient for it to recombine with enough water to change back to the original calcined gypsum. Because of this fact and also because the soluble anhydrite is itself crystalline, the effect of this severe grinding is lost, and the product is still non-plastic. Commercial gypsum plasters consist mostly of calcined gypsum, with more or less soluble anhydrite and undecomposed gypsum.

I find that if calcined gypsum is ground severely so as to liberate the water, but in such a way that the water cannot escape, the resultant product has radically different properties. It is now plastic, rather than non-plastic. This can be proved by testing the material by means of the Carson blotter test as described in the Transactions of the National Lime Manufacturers' Association, 1916, p. 175, or by means of a plasticimeter.

From another source of information the favorable results are accounted for on a somewhat different basis which in substance is as follows:

High speed mills do not give as large an amount of superfine material as the tube mill does. This is borne out in the cement industry in the replacement of high speed mills by compound mills using metallic grinding bodies.

Apparently all materials when mixed with water will show a more creamy texture with increasing fineness. This is particularly true in the grinding of cement clinker, lime and plaster. The reason for this probably is

that the clinker or gypsum particles are produced in such sizes as to approach colloids, which, due to the surface tension, form the peculiar creamy texture.

An engineer of a large gypsum company has the following comments to make in regard to tube mill grinding.

Our gypsum is approximately 78% pure with a hard dolomite impurity for the greater part and a soft black shale in minor quantities. For tube milling this is taken from Raymond mills with a fineness of 97% through the 100-mesh sieve and calcined. The stucco then has a consistency of 62 to 68% (% water used with plaster to make a standard consistency). After tube milling the screen test shows 5-10% on the 40-mesh and 80-90% through the 100-mesh, with a consistency of 66-72%. The tube-mill stucco is apparently coarser, but this is only apparently since most, if not all, of the material retained on these two screens consists of tube-mill flakes, which are easily broken up and passed through the screen. Any material retained on the 100-mesh after brushing is entirely dolomite. There has been some controversy between the service and quality departments over the matter of the tube-mill flakes in finish coat plaster. The service department contends that the flakes are noticeable in the application of the plaster while the laboratory says the flakes cannot be seen after mixing. In fact, a whole cupful of flakes would immediately disintegrate upon the addition of water. Of course, the flakes are just very compacted finely ground gypsum, which it appears are centered around one or more particles of dolomite.

The following table shows the results of comparative tests made on plaster initially ground by a ring roller mill, calcined and reground with a tube mill, and plaster made by one stage grinding by a ring roller mill.

	Tube mill regrind	Ring roller mill one-stage grinding
Gross weight of sack of plaster	102½ lb.	102½ lb.
Circumference of sack, 3 ways	41½x65x88½	41x63½x87½
Weight of 1 cu. ft. of plaster loose	50 lb.	55½ lb.
Weight of 1 cu. ft. of plaster packed	57 lb.	62½ lb.
% passing 40-mesh sieve dry	88	100
% passing 60-mesh dry	76	100
% passing 100-mesh dry	?	98
% passing 200-mesh dry	?	94½
% passing 100-mesh sieve wet	97½	99
% passing 200-mesh wet	93	98
Consistency, or % water carrying capacity	70	80
Wet volume with 2½ parts sand	100	110
Weight of 3 briquettes, 2½ parts sand	325	320 grams
Tensile strength, lb. per sq. in. in 6 days	118	170
Texture of wet mix	Creamy	Coarse

Texture of set	Granular	Rippled
Plasticity, blotter test	Good	Poor
Sand carrying capacity	Good	Good
Chemical Analysis:		
Purity (CaSO ₄ ½ H ₂ O)	79.41	91.62
Limestone	10.18	4.25
Insoluble	6.14	2.20
Miscellaneous	4.27	1.92
Free of mechanically held water	.47	.39
Combined water	5.52	6.05

In discussing the results it may be well to first explain that the dry screen test through the 100- and 200-mesh sieve is omitted for tube-mill stucco because it is practically impossible to satisfactorily screen this plaster. With the 40- and 60-mesh screens the tube-mill flakes are considered as oversize.

In favor of the tube-milled plaster is its light weight, creamy texture and plasticity. These conditions have obviously been brought about by this particular type of regrinding, which is especially interesting because by examining the chemical analysis it may be seen that nature has worked against these advantages.

The other sample of plaster manufactured by one-stage grinding in the ring roller mill shows up particularly well from a standpoint of strength, wet bulk and sand carrying capacity. The reason for this is that the gypsum content of this sample is so much higher than it was in the other sample.

Conclusion

Without doubt, during the past ten years there has been a very definite trend among gypsum manufacturers to install or convert their equipment to tube mills for regrinding. It is a little too soon to predict that this type of grinding is to be considered as a fixed standard for the present. Some manufacturers have not as yet accepted them as an improvement. The fact that these mills are comparatively expensive to install and operate is another reason why a different process to accomplish the same results would be very acceptable.

At present machinery manufacturers are working on a new type of machine for regrinding gypsum which will produce as good or better plaster and yet be a more economical machine for the purpose. This development is sufficiently advanced so that it is actually being tried out on a commercial basis. Favorable results of this new machine or some other yet to be developed may effect quite a revolutionary change in the gypsum industry.

Regrinding gypsum wall plaster is generally accepted as a necessary process to produce the most satisfactory quality plaster. The tube mill is probably far superior to any other equipment used for this purpose. In fact tube-milling a very low purity gypsum rejuvenates it to such an extent that plaster made from it can be sold where previously it had been a drug on the market.

Open-Price Hearing—Addendum

IN the report of the public hearing on open-price policy for the crushed stone, sand and gravel and slag industries, at Washington, D. C., April 5, a rather important part of the proceedings was omitted—that is a part important to limestone quarry operators who also sell agricultural limestone.

E. J. Krause, president of the Columbia Quarry Co., St. Louis, Mo., official representative of District 3, Region 9, successfully advocated exemption of agricultural limestone, not from the open-price policy, but from uniform rules and conditions of sale—that is from the uniform quotation blank and uniform contract form. The reason for this exemption, which was granted, is that it would disrupt relationships now existing between producers of agricultural limestone, producers' organizations, and farmer organizations.

In this region, as well as in many others, much agricultural limestone is sold through farmer cooperative agencies, such as the Illinois Agricultural Association, under special conditions as to terms, discounts, etc. To have enforced the standard contract form for crushed stone would obviously have disorganized this effective and efficient distribution system.

Mr. Krause also presented protests of two local sand companies that the contract form suggested was inadequate, in their opinion. He also objected to this form of contract as applied to the sale of metallurgical limestone. Mr. Krause is a member of the code authority of the aggregate industries and vice-chairman of District 3, Region 9.

Sand-Lime Brick Production and Shipments in April, 1934

THE following data are compiled from reports received direct from producers of sand-lime brick located in various parts of the United States and Canada. The accompanying statistics may be regarded as representative of the industry.

Twelve sand-lime brick plants reported for the month of April, this number being four more than the number reporting for the month of March, 1934, statistics for which were published April 25:

Average Prices for April

Shipping point	Plant price	Delivered
Detroit, Mich.	.....	\$11.00
Syracuse, N. Y.	\$16.00	20.00
Mishawaka, Ind.	8.50	.....
Grand Rapids, Mich.	.....	12.00
Saginaw, Mich.	10.00	.....
Dayton, Ohio	10.00	12.00
Madison, Wis.	11.00	12.50
Toronto, Ont., Canada	12.00	13.50

Statistics for March and April

	†March	*April
Production	562,975	436,500
Shipments (rail)	126,000	29,000
Shipments (truck)	721,011	1,005,625
Stocks on hand	755,093	1,518,443
Unfilled orders	355,000	705,000
†Eight plants reporting; incomplete, three not reporting unfilled orders.		
*Twelve plants reporting; incomplete, three not reporting unfilled orders.		

Rock Products News Briefs

Sand and Gravel

Hardy Sand Co., Camden, Tenn., has added a \$5000 mixing or blending plant to make special sands, or sands for special purposes.

Dillman Industries, Inc., Caruthersville, Mo., has installed a permanent screening and crushing plant for handling Mississippi River sand and gravel. Hitherto the company made only river-run road gravel. Among the company's other interests are the manufacture of egg crates, baskets and boxes.

Construction Aggregates Corp., reorganized from the Construction Materials Corp., now in bankruptcy, has opened the Ferrysburg, Ind., plant. The million-dollar plant was never entirely completed. It was designed to be one of the largest in the territory. It is on Lake Michigan, opposite Chicago.

Thornton Bros., St. Paul, Minn., contractors, were given permission by Duluth, Minn., city authorities to erect a sand and gravel plant on Lake Superior waterfront, over the protests of local producers, the Manufacturers' Council and neighboring residents.

Granite Materials Co., Los Angeles, Calif., succeeded in getting permission from the city council to establish a new gravel crushing plant on Tujunga Ave., near Roscoe Blvd. Then the mayor vetoed the ordinance. The council failed to over-ride the veto. Since then this section has been accepted by NRA as a permissive area in which no new plants may be established without its permission.

Ohio Gravel Co., Cincinnati, Ohio, had its dredge sink May 9. The insurance companies speedily raised it.

Lime

National Lime and Stone Co., Carey, Ohio, has been ordered by Carey City Council to control an alleged dust nuisance arising from its limestone crushing and grinding operation; this illustrates the growing opposition to industrial dusts of all kinds, since in very few instances have lime or limestone dusts been held to be harmful to health.

Thomas Coal and Lime Co., Pueblo, Colo., according to local newspapers, has operated to capacity since last fall. Demand for lime for processing ores and for railway water softening plants accounts for the business, which is nearly all within the state.

Cheney Chemical Co., Elyria, Ohio, manufacturer of magnesium from dolomite,

and of lime byproducts, lost its plant by fire the latter part of April. The loss was about \$10,000. The plant will be rebuilt at once.

Gypsum

Standard Gypsum Co. has been purchased by the Pacific Portland Cement Co., which has had a gypsum plaster division for many years. The Standard company will be merged with the Pacific company, with Martin Uldall, former president of the Standard company, in charge of the gypsum operations of the Pacific company. The Standard's plants were at Seattle, Wash., Long Beach, Calif., and Ludwig, Nev.; the company was established in 1919. The combined assets of the two companies exceed \$20,000,000.

Gypsum, Lime and Alabastine, Canada, Ltd., Montreal, Que., announces that for the first four months of the current fiscal year ended March 31, sales showed an improvement of more than 50% over the corresponding period of last year. April business to date is reported as being substantially in excess of last year, with particularly good export orders coming in. The English plant, in which Gypsum, Lime and Alabastine and Honeywill and Stein, a subsidiary of Distillers Co., are interested, was expected to start operations on May 15 and because of continued building activity in England, is expected to contribute substantially to this year's profits. Gypsum, Lime and Alabastine's bank loans are now substantially less than a year ago. As the company is now entering its most profitable period of operations, due to building activity, it is expected that the cash position will improve from now on.

United States Gypsum Co., Chicago, Ill., was operating at 14% of capacity a month ago, according to what Sewell L. Avery, president of the company, told his Montgomery Ward & Co. stockholders. Incidentally, Mr. Avery, who is also president of Montgomery Ward & Co., created a very favorable impression at its stockholders' meeting. The *Wall Street Journal* (New York City) reported the meeting in part as follows:

"The several hundred stockholders who attended the 1934 Montgomery Ward annual meeting, as contrasted with the scattered few (only 13 not associated with the management) a year ago, came away with something more than the tangible results of the meeting. * * * Sewell L. Avery, in the course of a business career which built up and firmly established his reputation as a thoroughly competent industrial executive, acquired the reputation in circles outside his intimates of being rather austere; aloof and to some extent mysterious. Stockholders and

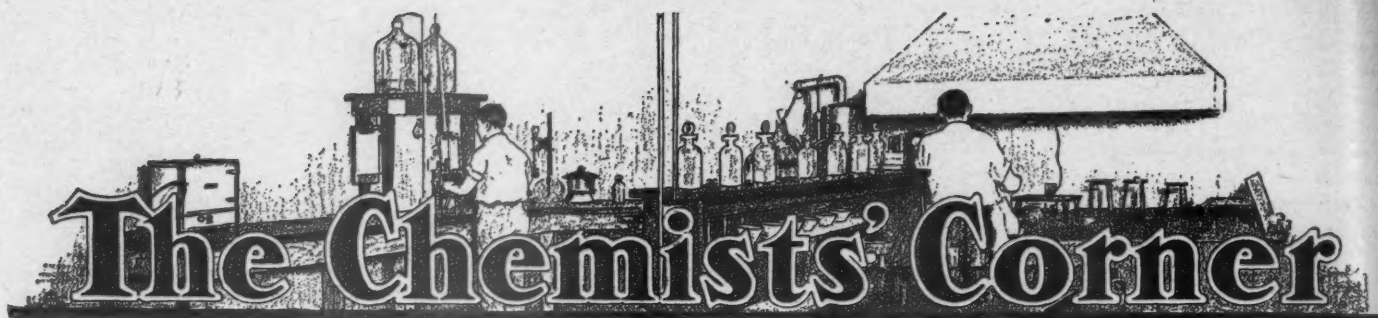
press representatives at this meeting saw him as his intimates know him—a man thoroughly at ease in a meeting, whether entirely friendly or not; willing to answer and discuss any and all questions; and adept at relieving a serious occasion with comic relief in a manner which brought him frequent applause even as he answered the more belligerent stockholders. His personality by its very persuasiveness and charm dominated the occasion. Shifting readily from grave to gay with a frequent whimsical touch, he held the close attention of the meeting from the recital of his close friend Julius Rosenwald's remark in 1931 that he didn't believe Mr. Avery would become connected with Ward as 'Sewell is too smart a man to do a foolish thing like that,' down to the remark that 'if the directors do not think I am earning my salary they can fire me in three minutes.'"

California Aggregate Producers Win First "Permissive Areas"

THE PROGRESSIVENESS and aggressiveness of West Coast businessmen is well illustrated in NRA administrative order No. 109-15, which approves the establishment of permissive areas in California under the code of fair competition for the Crushed Stone, Sand and Gravel, and Slag Industries—the first permissive areas so far allowed. In a permissive area, under the code, no new plants may be established or productive capacity added to existing plants without permission of the Code Authority.

The California state committee which prepared the data was one of the first to get into action and has been about the most persistent and thorough in meeting all the various requirements from time to time. The action of NRA in establishing permissive areas sets a precedent, and action in other states should follow rapidly, if they profit by the example the Californians have set. The case was excellently handled by the Washington staff of the Code Authority.

The NRA order reads: "The said areas shall be established as 'permissive areas' on an experimental and tentative basis for a trial period of ninety (90) days from the effective date of this order, which period may be extended upon cause being shown that such a renewal will tend to effectuate the purposes of the act. During such trial period the Regional Committee for Region No. 15 and/or the standing committee for the state of California shall furnish such information as to price trends within any permissive area, as to the proceedings of the said standing committee, including its action on any proposed increase in capacity, and as to the operation of any pertinent provision of the said code, as the administrator may hereafter require."



Determination of Particle Size Distribution in Mineral Powders by Air Elutriation

R. N. Traxler and L. A. H. Baum,
The Barber Asphalt Co., Maurer, N. J.

A KNOWLEDGE of the size distribution of the particles in powders which are to be used as fillers or stabilizing agents is of importance, because within certain limits the minimum void content and the size of the individual pores in the packed powder decrease with increased size heterogeneity. Consideration must also be given to the measurement of particle size, shape and surface texture, all of which govern the surface area presented by unit weight or volume of the dust. All of these fundamental physical properties of mineral fillers have been briefly discussed by Miller and Traxler.¹

The methods of determining particle size distribution in any pulverulent material are either indirect evaluation or direct measurement. Various indirect methods have been developed by Odén², Wagner³, Knapp⁴ and others. Knapp's modification of Odén's settlement method, and Wagner's turbidimeter were developed to rapidly determine the size distribution in cement dust. Either of these methods should be of use in analyzing soft powders which, because of excessive attrition, cannot be accurately analyzed by the method of air separation described below. Whenever possible the accuracy of any indirect method should be checked by some direct one.

Accurate and rapid methods of direct measurement of size distribution in powders possessing wide ranges of particle size consist of two operations: (1) dividing the powder into several rather close size fractions, and (2) microscopic measurement and count of individual particles in each of the fractions. The separation of the powder into several fractions may be accomplished by elutriation using either a liquid or a gas. One disadvantage of liquid elutriation lies in the possible hydration or solution of the particles by the dispersing medium, which causes the rate of fall of the small particles to be retarded. Another disadvantage of liquid elutriation is the difficulty often encountered in the complete removal of liquid

Synopsis

THE determination of particle size distribution in powders used as fillers is important because the void content and the size of the individual voids in the compacted powder decrease as the particle size heterogeneity increases. A method and apparatus for the determination of particle size distribution in mineral powders by air elutriation is described in detail, and the method of presentation of the experimental results briefly discussed. Data are given for several different commercial powders.

—THE AUTHORS.

from the fraction prior to weighing. Further, if the fraction is to be used in other investigations the liquid elutriation methods are unsatisfactory since on subsequent dis-

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integration of the dried cake both the particle size and size distribution are altered.

All fine powders tend to agglomerate or form clusters of particles, and to adhere to surfaces with which they come into contact. The clusters will fall with a velocity equal to that of a particle whose diameter approximates the diameter of the agglomerate. Failure of many of the elutriators proposed has been due to improper dispersion of the powder and the adherence of the finer particles to the surface of the settling tubes. In the apparatus described below dispersion is accomplished by means of an air jet impinging on a mass of particles which are moving in such a manner as to continually present a fresh surface. Precipitation on the cylindrical portion of the settling tube is prevented by warming to a temperature slightly above that of the slowly moving stream of suspended particles. Three factors which are of great importance in the design and operation of the air elutriator are: (1) proper size and location of the nozzle, (2) proper presentation of the powder to the air, and (3) removal of conditions favoring precipitation of the aerosol.

Microscopic measurements and count of the individual particles can be carried out on an unfractionated powder but it is laborious, and with powders of a wide range of particle size may be quite inaccurate since it is impossible to have all of the different sizes of particles in focus at the same time and while changing the focus of the microscope, omission or duplication may occur. Preparation of slides which are truly representative of an unfractionated material is also very difficult. However, by examining fractions of rather close size limits, all of these difficulties are greatly reduced.

Description and Operation of the Apparatus

The difficulties previously encountered in air separators for analytical work were largely eliminated in an apparatus described

by Roller[®]. Although the fundamental principles of his apparatus and technic of operation have been maintained, certain improvements which will be described have been incorporated. Fig. 1 shows the apparatus in a sound and heat insulated cabinet; the lower portion, which is not shown, houses the air conditioning system. Compressed air was led through bottles containing 1:1 sulfuric acid, safety bottles, and finally through Venturi flowmeters. The sulfuric acid assured maintenance of a constant humidity for the air delivered to the machine. Flowmeters with capillaries 3 and 4 mm. in diameter handled all of the rates of flow needed for materials of specific gravity 2.5 to 3.0 using the settling tubes described below.

A weighed quantity of powder (25 grams) was placed in the glass U-tube which had an inside bore of 3 cm. and a capacity of 125 c.c. The tube was attached to the bottom of the settling chamber by means of a piece of rubber tubing. Hose clamps were used to insure air-tight connections. To the other end of the U-tube was fitted a stopper carrying a metal nozzle which was so curved that the tip rested under the powder and delivered the air along the U-tube. The dispersing action of the jet of air entering the powder is dependent upon the rate of flow, the jet velocity and the humidity of the air. With a fixed rate of air flow the jet velocity may be varied by using different sizes of nozzles. For removing particles up to 2 microns in diameter a 1-mm. nozzle was used. This gave a jet velocity of almost 80 meters per second with the rate of air flow required in the 20-in. settling tube to remove particles less than 2 microns in diameter. A nozzle about 5 mm. in diameter was used for removing the larger fractions. Jet velocities above 80 meters per second tend to increase attrition due to the violence of the agitation in the U-tube whereas, for the finest fraction velocities appreciably less than that above increase attrition because of the length of time required to accomplish complete dispersion.

A motor driven shaft revolving about 300 r.p.m. carried a cam which actuated a small hammer equipped with a cork head. As the cam revolved the hammer was pulled away from the rear base of the U-tube and then released thereby allowing it to strike the U-tube under the force applied by a spring. The tension on this spring must be adjustable in order that the force of the blow applied to the U-tube may be controlled. A collar and bar were attached to the end of the U-tube which carried the air nozzle. The bar rested in a groove in a vertically adjustable post which supported the front end of the U-tube and prevented it swinging from side to side. A spring adjusted by means of a thumb screw regulated the pressure on an arm which held the bar in the groove. When the cork headed hammer hit the U-tube, the tube was thrown forward and upward. This movement, however, was resisted by the pressure exerted upon the bar resting in the groove. The force of the blow, the height

of the front end of the U-tube, and the downward pressure applied through the bar to the front end of the tube must be so regulated that the powder reposing in the U-tube rolls over and over, climbing up to the front end and rolling down toward the back. This movement of the powder is necessary to assure new material being constantly presented to the blast of air issuing from the nozzle tip.

The dust was blown from the U-tube into the settling tube. The larger tubes were made with a cylindrical section about 12 in. high, a long steep lower cone and a short flat upper one. In order that they might be opened for cleaning and polishing, the 20- and 10-in. tubes had the upper cones bolted to the cylindrical portion. The 5-, 2½- and 1¼-in. tubes were made in one piece. All of the settling tubes were made of stainless steel and were highly polished on the inside. Mechanical tappers attached to the shaft,

which carried the cork headed hammer, were used to vibrate the settling tube in order to dislodge dust which might settle on the lower cone, thereby assuring return of oversize and undispersed material to the U-tube. If complete return of the undispersed material to the U-tube was not accomplished, a smaller quantity of fines than actually existed in the powder was found. Small air hammers located at the proper height on the cones and operated so as to give the correct magnitude and frequency of vibration to the settling tubes might be an improvement over the mechanical tappers. Goosenecks equipped with lead tips were screwed into the top of the settling tubes. C. S. & S. No. 603 single thickness paper extraction thimbles 94x33 mm. fastened by means of hose clamps over the lead tips were found to be satisfactory receivers for the dust which was blown over. Before a run was started the conditioned air was blown through the thimble until it

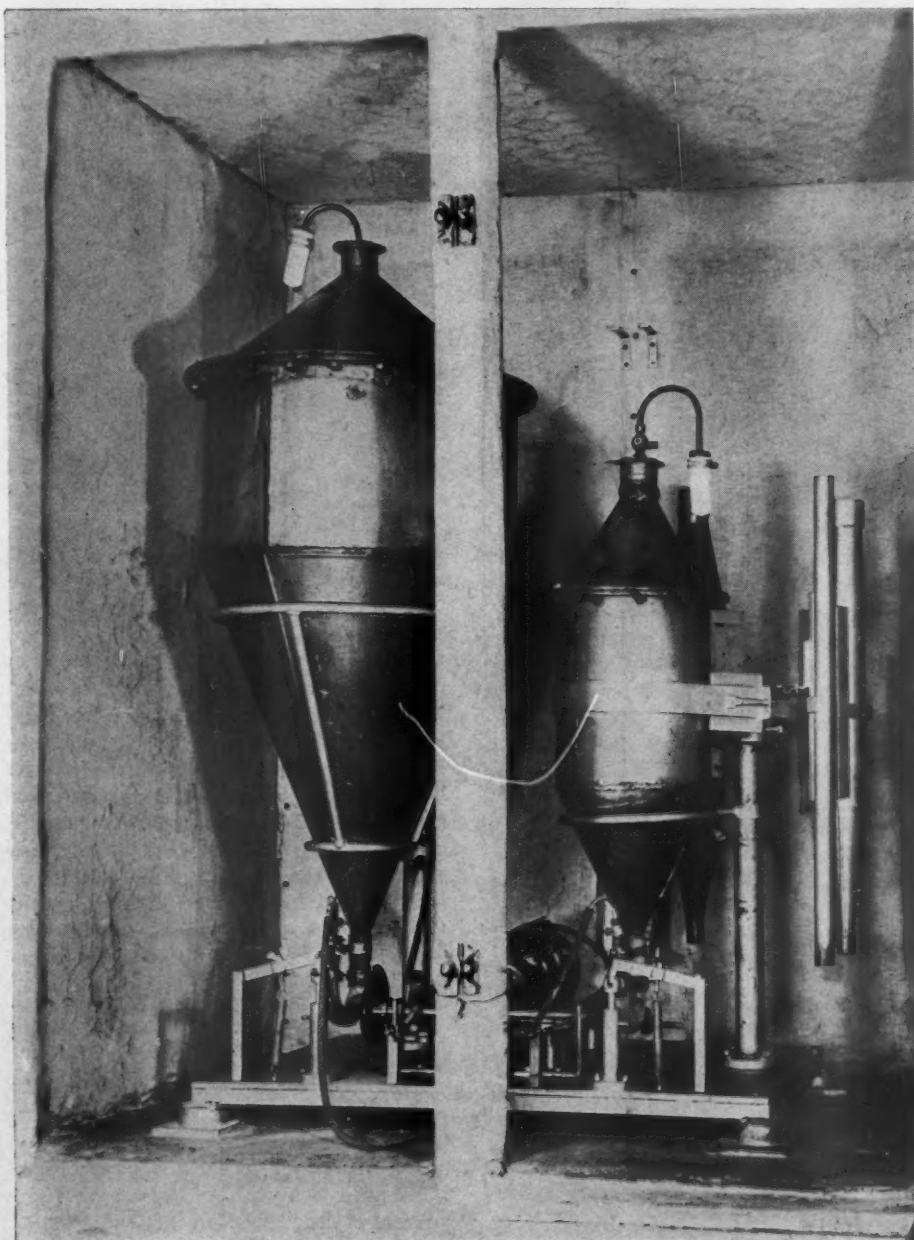


Fig. 1—Air separator in insulated cabinet

reached a constant weight. Weighings were then made every hour for the minus 2 micron fraction, every 30 minutes for the 2 to 5 micron fraction, every 15 minutes for the 5 to 10 micron fraction, and every 5 minutes for the larger. When the increase in weight dropped to 10% or less than that of the first weight obtained, the run was considered completed and the next size fraction collected. However, the completeness of the separation was checked by a microscopic examination of the residue. A discussion of the determination of the end point has been given by Roller⁷.

A dispersion of fine mineral particles in a gas behaves like smoke, the solid particles of which will condense on a cold and be repelled by a warm surface⁸. With this fact in mind a temperature gradient was established between the metal and the slowly moving stream of aerosol. Under these conditions the attraction and adherence of the fine particles to the surface of the settling tube was reduced to a negligible amount. Temperature control was necessary only for the three finest fractions, and with these the tubes were maintained at a temperature not more than 3 deg. to 5 deg. C. above that of the stream of air carrying the solid particles. If too great a temperature difference was established or the metal tube was not heated uniformly, difficulty was encountered due to the development of convection currents in the aerosol. To uniformly heat the tubes the apparatus was placed in a heat insulated cabinet and air warmed by means of an electric heater circulated around the tubes by a fan. Windows were provided in the cabinet so that the operation of the machine could be observed without opening the doors.

Knowing the density of the mineral and the maximum diameter of the particles to be removed from the sample, the velocity of air in the cylindrical portion of the settling tube is calculated from Stokes' law which may be expressed as:

$$V = \frac{d^2 g p \times 10^{-8}}{18\eta} \quad (1)$$

where

V = velocity of fall in a stationary fluid in cm./sec.

d = diameter of particle in microns (1 micron = 10^{-4} cm.)

g = gravitational constant in cm/sec.²

p = density of solid in gm/cm.³

η = viscosity of fluid (air) in poises.

Knowing the diameter of the settling tube to be employed for the removal of the particular size fraction and the necessary air velocity, the rate of flow may be calculated from the equation:

$$F = \frac{V \times 60}{1000} \times \frac{\pi D^2}{4} \quad (2)$$

where

F = flow of air in liters per minute.

V = velocity of air in cm/sec. necessary to carry over largest particles of the particular fraction.

$\frac{60}{1000}$ = factor to convert cm³/sec. to liters/minute.

and
 πD^2

= cross sectional area of settling tube of diameter "D" in centimeters.

For simplicity the constants may all be brought together, giving:

$$\frac{\pi \times 60}{1000 \times 4} = 0.047$$

and thus equation (2) simplifies to:

$$F \text{ (liters/minute)} = 0.047 \times V \text{ (cm/sec.)} \times D^2 \text{ (cm.)} \quad (3)$$

Table I shows the size fractions which were removed in the various sizes of settling tubes. The velocities of air through the cylindrical part of the settling tubes in centimeters per second and the rate of flow in liters per minute to effect removal of each fraction are given for particles of 3.00 specific gravity.

TABLE I—SIZE FRACTIONS REMOVED IN VARIOUS SIZES OF SETTLING TUBES

Diameter of settling tubes (inches)	Size of fraction (microns)	Velocity of air in cm/sec.	Rate of flow in liters/min.
20	2	0.036	4.38
20	2-5	0.227	27.6
10	5-10	0.909	27.6
5	10-20	3.63	27.6
2½	20-40	14.5	27.6
1½	40-80	57.5	27.6

The velocity, V_x , which must be used for any material of specific gravity = x may be calculated from the values given in column 3 of Table I by means of the following equation:

$$V_x = \frac{\text{sp. gr. } x}{3.00} \times V_{3.00} \quad (4)$$

where $V_{3.00}$ is the velocity required with a material specific gravity = 3.00.

Stokes' law for the settling of spherical particles through a viscous fluid was found to apply with a sufficient degree of accuracy, even for powders composed of particles of irregular shape, if the proper average diameter was calculated from the measured dimensions. Where the axes of the particles were of nearly the same length, a statistical average diameter approached closely to that calculated. However, for particles whose axes varied greatly in magnitude, e. g., foliated or acicular particles, it was found that the harmonic mean diameters⁹ were necessary to closely approximate that calculated from Stokes' law.

Microscopic Measurement of the Size Fractions

After the separation of the powder into several sharply defined size fractions the final step in the determination of size distribution was a microscopic count and measurement. Micro-projection was used to facilitate measurement of length and breadth and count of the particles. In this case the magnification was determined by projecting a stage mi-

crometer on the screen. A scale was then ruled on a piece of drawing paper to read directly in microns and each particle measured by means of this scale. The depth or thickness of a particle was determined by focusing first on a scratch on the microscope slide and then on the top of the particle. A rack and pinion reading directly in microns gave the thickness of the particle. This measurement was made on a number of the particles of the larger size fractions. The average ratio between this dimension and the other axes was calculated and used to estimate the thickness of the smaller particles. In order to obtain the size distribution in each fraction and in the powder as a whole, all of the particles in each field viewed were measured and grouped according to size. After counting several fields the results were totaled, giving the number of particles of each size in a given fraction (see Table 2).

Because the fractions viewed had close size limits, the errors due to improper sampling, difficulty in obtaining a representative field and incorrect count due to lack of depth of focus, all of which exist in the microscopic examination of an unfractionated powder, were greatly reduced. However, in the preparation of a microscopic slide of a fraction containing rather uniform but small particles the dispersion of the individual particles was very important. For the finest fractions a dilute solution of saponin in alcohol was found to be a good dispersing agent which left the solid particles adhering to the glass slide after the solvent had evaporated.

Presentation of Data

From the particle size data obtained experimentally the distribution of surface area, volume or weight may be calculated. The choice of the property which should be considered depends upon how the powder is to be used, but the significance of no property should be overlooked.

The surface mean diameter and specific surface of a powder are good indices of its fineness. The surface mean diameter d_s , which is used in calculating surface area is expressed by

$$d_s = \frac{\sum W}{\sum \frac{W}{d_s}} \quad (5)$$

where W = weight per cent of each fraction, and d_s = surface mean diameter of each fraction. d_s is obtained by dividing the sum of the cubes of all of the microscopically measured diameters for any size fraction by the sum of the squares of the diameters or expressed mathematically:

$$d_s = \frac{\sum nd^3}{\sum nd^2} \quad (6)$$

where d = microscopically measured diameters, and n = number of particles of diameter d .

Table 2 shows the data obtained experimentally for the 10-20 micron fraction of a

silica dust and the values used in calculating d_s for that fraction.

TABLE 2—CALCULATION OF SURFACE MEAN DIAMETER OF FRACTIONS

d measured diameters, in microns	n Number of particles measured	nd^2	nd^3
9	36	2,916	26,244
11	65	7,865	86,515
13	68	11,492	149,396
15	74	16,650	249,750
17	51	14,739	250,563
19	20	7,220	137,180
21	3	1,323	27,783
		62,205	927,431
$d_s = \frac{927,431}{62,205} = 14.9$			

Table 3 shows the calculation of the surface mean diameter, d_s , for the unfractionated silica powder.

TABLE 3—CALCULATION OF SURFACE MEAN DIAMETER OF UNFRACTIONATED PARTICLES

Size fraction in microns	Weight per cent W	d_s	W d_s
—2	10.9	1.2	9.050
2-5	12.7	3.9	3.245
5-10	12.6	7.7	1.632
10-20	22.9	14.9	1.537
20-40	31.0	31.0	1.000
40-80	9.1	59.0	0.154
+80	0.8	100.0	0.008
$\Sigma W = 100.0$			$\Sigma \frac{W}{d_s} = 16.626$

and from equation (5)

$$d_s = \frac{100}{16.626} = 6.01 \text{ microns.}$$

The surface area presented by any size fraction in one gram of unfractionated powder is given by

$$S = \frac{6W \times 10^3}{\rho d_s} \dots \dots \dots (7)$$

where

S = surface area in cm^2 ,

W = weight per cent of fraction,

ρ = density of solid, and

d_s = surface mean diameter of fraction.

The surface area in cm^2 presented by one gram (the specific surface) of the unfractionated powder may be obtained by replacing d_s by d_s in equation (7), W being 100.

The various comminuted solids should be compared in respect to size distribution without regard to the actual size of the particles. A number which indicates the size homogeneity of a powder and which is independent of the actual size of the particles and of units of measurement is given by equation (8), which is derived from that developed by Green.⁹

$$U_s = d_s \sqrt{\frac{\Sigma W}{2 \Sigma [W (d_s - d_s)^2]}} \dots \dots \dots (8)$$

where

U_s = uniformity coefficient of the unfractionated powder based on surface,

d_s = surface mean diameter of unfractionated powder,

W = weight per cent of size fractions, and

d_s = surface mean diameters of size fractions.

Experimental Data

Tables 4 to 8 inclusive give the weight percents of the various fractions of several mineral powders, together with the surface area of each fraction, which total to give the specific surface (surface area per gram) of the unfractionated powder.

TABLE 4—POWDERED LIMESTONE

Size fraction in microns	Weight per cent W	Surface in sq. cm.
—2	9.0	1975
2-5	10.7	670
5-10	12.7	372
10-20	15.9	233
20-40	25.0	183
40-80	20.1	73
+80	6.6	14
	100.0	3520

TABLE 5—POWDERED MARBLE

Size fraction in microns	Weight per cent W	Surface in sq. cm.
—2	9.1	2030
2-5	8.7	558
5-10	12.8	381
10-20	17.6	262
20-40	29.4	220
40-80	21.5	80
+80	0.9	2
	100.0	3533

TABLE 6—POWDERED TRIPOLI

Size fraction in microns	Weight per cent W	Surface in sq. cm.
—2	5.8	1340
2-5	14.2	937
5-10	18.4	565
10-20	41.4	575
20-40	18.5	141
40-80	1.7	7
	100.0	3565

TABLE 7—POWDERED PUMICE

Size fraction in microns	Weight per cent W	Surface in sq. cm.
—2	5.3	1310
2-5	20.4	1460
5-10	37.0	1235
10-20	25.0	417
20-40	12.3	103
	100.0	4525

TABLE 8—POWDERED GREEN SLATE

Size fraction in microns	Weight per cent W	Surface in sq. cm.
—2	23.3	4950
2-5	34.0	2060
5-10	15.2	430
10-20	22.0	310
20-40	5.5	38
	100.0	7788

A tabulation is given below which compares the uniformity coefficient (U_s) of ten powders with their void content in a closely packed condition as determined by the briquetting method described by Traxler, Baum and Pittman.¹⁰

TABLE 9—UNIFORMITY COEFFICIENTS COMPARED

Powder	Uniformity coefficient U_s	Per cent voids by briquetting
Limestone	0.326	31.5
Red slate	0.363	30.6
Marble	0.393	33.0
Pure silica*	0.408*	45.0*
Trap rock	0.418	33.0
Tripoli*	0.418*	54.5*
Dolomite	0.443	31.0
Green slate	0.537	43.6
Black slate	0.547	47.8
Pumice	0.679	48.7

The powders possessing the greatest particle size heterogeneity (smallest uniformity coefficient) have the smallest void content values. Also, data which we have collected indicate that the sizes of the individual voids in the compacted powder decrease with increase in particle size heterogeneity. The two materials marked by asterisks are silica dusts; their high void contents may be due to the interfacial relationships existing between silica and water.¹¹ Of course, the void content of the tripoli is high also because of the great porosity of that mineral. The small discrepancies between void contents and uniformity coefficients for the eight other powders are probably chiefly due to the influence of particle shape and differences in surface regularity.

The authors wish to express their indebtedness to C. U. Pittman for reviewing the manuscript.

Efficiency of Agitators for Sand Classification

WHITE AND SUMERFORD, of the University of North Carolina, have been studying agitation effects in an agitator of the plain paddle type. Their paper is published in a recent issue of *Industrial and Engineering Chemistry*. In an earlier paper they reported that there could be no uniformity of concentration of unclassified sand in such an agitator as the action of the paddle was to classify, sending the fines to the wall of the tank while the coarse grains collected under the paddle in the center.

In the experiments described in this paper four sizes of sand were used, 32 to 42-mesh, 48 to 65-mesh, 65 to 100-mesh and 80 to 150-mesh, Tyler sieves. Paddle speeds varied from 18 to 88 r.p.m. At the lowest speed even the finest sand could hardly be detected in suspension and at the highest there was a marked coning of the water and slight splashing and all the sands were in suspension. One of the curves with the paper shows how much more agitation was required to suspend the coarse than the fine particles. At 30 r.p.m. when there were 350 mg. of the finest grains in 100 cc. of water at the sampling point, there were only 7 mg. of the coarsest grains.

Changes in agitator speed gave somewhat similar curves of sand concentration for all sizes, a flattish curve rounding to a vertical. These were confirmed by visual observation. At low speeds of the paddle the grains lay on the bottom with slight movement; at higher speeds vertical currents were found that produced some suspension and at still higher speeds centrifugal force began to combat the forces that made for uniform concentration by setting up classification and by making a higher concentration in some parts of the tank than others.

For every size of sand there was a speed at which concentration was called saturation, and it is suggested that the speed at which saturation takes place be used as a criterion for the efficiency of agitators.



Hints and Helps for Superintendents

"Ram-Rod" on Shovel

WAITING for a new carload of dynamite, the River Products Co., Iowa City, Iowa, lately drafted a small power shovel for extra duty. A length of heavy pipe was picked up on one of the shovel teeth for use in dislodging rock from upper ledges.



Shovel handling pipe section to dislodge loose stone

With this "coaxing" sufficient material was accumulated on the quarry floor to keep up loading operations until arrival of the explosives.

Safety Clamp and De-rail

By L. B. Reifsneider,
Cowan, Tenn.

IN an underground operation with particularly difficult haulage conditions, emergencies frequently required that trackmen or timbermen work on the main haulage ways during haulage hours.

Safety Rules read:

Men working on haulage ways must at all times be protected from moving haulage equipment by a red light and de-rail. On tracks with two-way traffic a red light and a de-rail will be placed on each side of the location where the work is being done, at least fifty (50) feet from the working party if such distance is available. On tangents where the light is visible fifty feet or more, the light and de-rail may be placed close together but on the curves, if possible, the light will be placed well ahead of the de-rail.

Except for inspection work, Timbermen and Trackmen must work in gangs of at least two men.

Inspection work consisted of inspecting

track, tightening rail joints, oiling and inspecting switches and turnsheets and checking gauge. Inspection of chutes, manways, ladderways, turnouts and all standing timber, including shaft and station sets and pipe hangers appertained to the timbering department. The management held each foreman personally responsible for conditions in his department.

Both timber and track crews were provided with light, roller-bearing, platform cars for their equipment. These cars were kept fully equipped with the tools necessary for their work. The equipment included two red lights with their stands and two de-rails. The cars were frequently inspected by the underground foreman and by the safety inspector.

The red light stands were made in three pieces. The base was a discarded 10-in. diameter carwheel, the hub of which was fitted with a short 1 1/4-in. pipe nipple. The standard was a piece of 1-in. pipe, 4 ft. long, which fitted into the 1 1/4-in. hole in the base. A Z-hook of 3/4-in. round iron, one leg of which was about 6 in. long and the other 2 in., was placed with the long leg inside the upper end of the standard and the red light hung on the short end. The stem of the Z-hook was long enough to allow the light to clear the standard.

Several types of carstops and de-rails were experimented with, but finally a modified form of a combined stop and de-rail, which was being used on the shovel and quarry operations on the surface was adopted. It met three requirements:

It must be positive.

It must be easily handled and quickly applied.

It must be of reasonable cost and of a design which could be made in the local shop.

No dimensions are given in the sketch as these vary with the diameter of the wheel, weight of equipment and load and the size of the rail. In this case the moving load was 3,000 lbs., the rail ran 20 lb. per yd. and the carwheel diameter was 12 in.

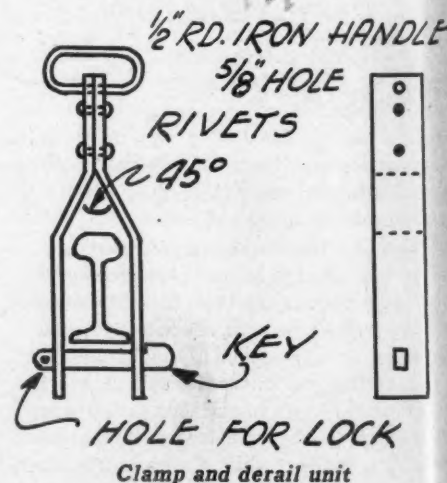
As far as possible the clamps were made of suitable scrap material found at the shop, and for this size clamp 5/8-in. by 3-in. iron was preferred for the clamp with 3/4-in. by 2-in. for the key.

Our experiments showed several things, among them that the clamp should fit over the rail loosely, 1/2 in. clearance on each side of the ball of the rail, 1/4 in. on each side of the base and about 1/2 in. between the top of the key and the bottom of the base. The angle where the two side plates join should be 45 deg. In 10- or 12-in. wheels the top of

the clamp should be 1/2 the diameter of the wheel above the rail; on larger wheels 1/3 the diameter is sufficient. If the key is made of round iron there is a tendency for the clamp to move along the rail when the weight of the car comes against it, and if the car strikes with momentum the clamp may shove ahead, tearing the rails loose from the ties. If the key is made of square-cornered iron, as the clamp tips forward with the weight of the car the square shoulder of the key bites into the bottom of the rail and locks. With sufficient momentum the car will climb the clamp; and as the clamp fits loosely it will swing slightly to one side, the flange of the wheel is deflected by the angle at the top of the clamp and the car is derailed.

A hole was drilled in the narrow end of each key and the track and timber foremen were provided with padlocks. When work was being done on haulageways the clamps were locked in place and the keys retained by the man in charge of the work until the work was finished or the track clear.

All loading faces, chutes, passing tracks and isolated switches were supplied with these clamps and two were carried on each



haulage motor. The total cost of each clamp was slightly under \$2.

In the surface operations clamps of this type but much heavier material were used everywhere. For 12-yd. standard gauge cars of 1 1/2-in. by 6-in. iron was used for the clamps, and the keys of 1-in. by 2 in. were found satisfactory.

Grizzly Built on Dump Truck

ROCK too large for the primary crusher were eliminated at the quarry of an Arizona plant by the use of this special grizzly of railroad iron built on the bed of

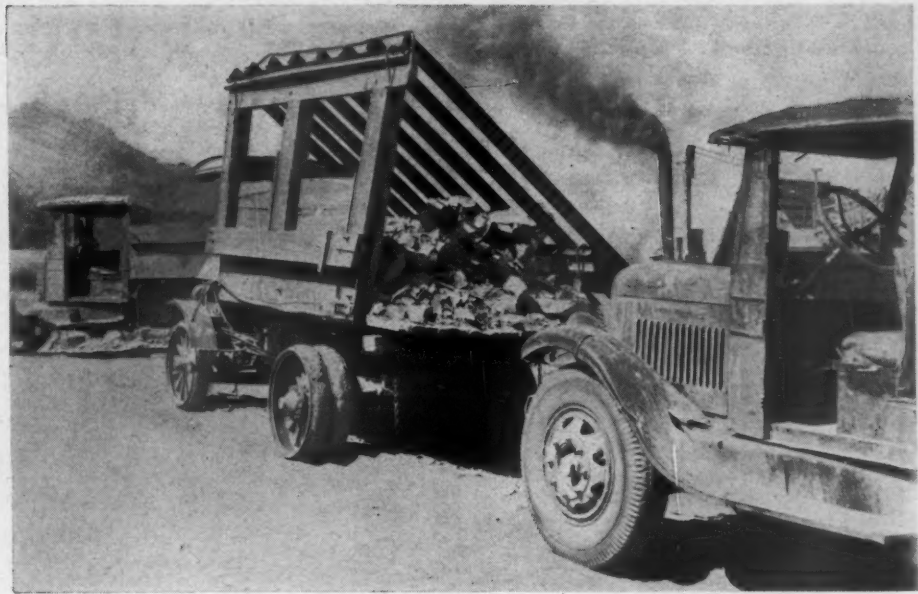
the truck used in hauling between quarry and crushing and screening plant. A power shovel was used in loading. (See illustration at right.)

Home-Made Flexible Coupling

THE SUPERINTENDENT of a New York state crushed stone plant, who does not want his machinery and equipment friends to think he is competing with them, contributes the following:

"The vibrating screens which we use for fine sizing are directly connected to an 1800-r.p.m., 3-horsepower motor through a flexible coupling. In the past we have used a jaw type flexible coupling in this place, and as long as the misalignment or angularity between the motor and the screen was slight, the old couplings worked fairly well. However, whenever one of the springs which support the screen breaks, a considerable angularity occurs which puts a tremendous stress on the coupling, and as a result we simply could not keep the couplings in working order.

"Because of this fact, I made up a coupling of my own design, which besides acting



Truck-mounted grizzly

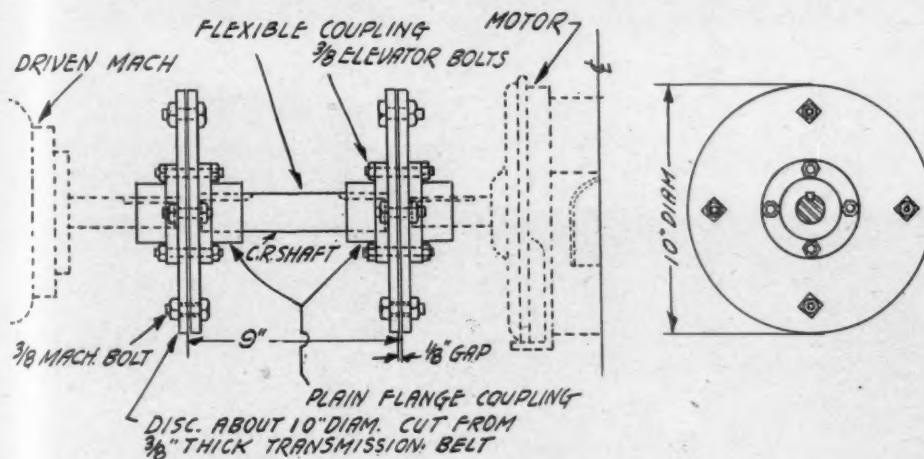
bolts a circular piece of transmission belting. The pieces of belting were in turn loosely bolted to each other with about an $\frac{1}{8}$ -in. gap between them.

scraper, running back 500 ft. at nearly a right angle to the conveyor line, discharges to the conveyor, which delivers an average of 250 tons of material in eight hours.

Estimated cost of lumber and labor for piling, etc., to support the usual pipe line equipment on this temporary operation, was about \$1,500. The present installation, however, which saves pumping and the wear and tear on a long pipe line, was made the past winter by the small force of year-around employees at no increase in operating charges. Construction was directed by Superintendent R. H. Ashley, as follows:

Barrels were sawed in half, filled with concrete, and the pipe sections anchored in them. They were shoved out on the ice to the proper location (see illustration), where the ice then was cut from beneath them, allowing them to sink through the 15 ft. of water. Before operations began this spring the bases of each pair of pipe standards were joined by lengths of rail and x-wires added above for support.

Total weight of the conveying apparatus is about 20 tons. It is suspended by strands of $\frac{1}{4}$ -in. wire cable reclaimed from an abandoned dragline operation. On a similar installation which Superintendent Ashley plans to make shortly, four strands of $\frac{7}{8}$ -in. wire rope will be used. The present conveyor is a 24-in. rubber belt, 395 ft. between centers. A 35-hp. motor is used on the conveyor, and a 150-hp. unit on the dragline.

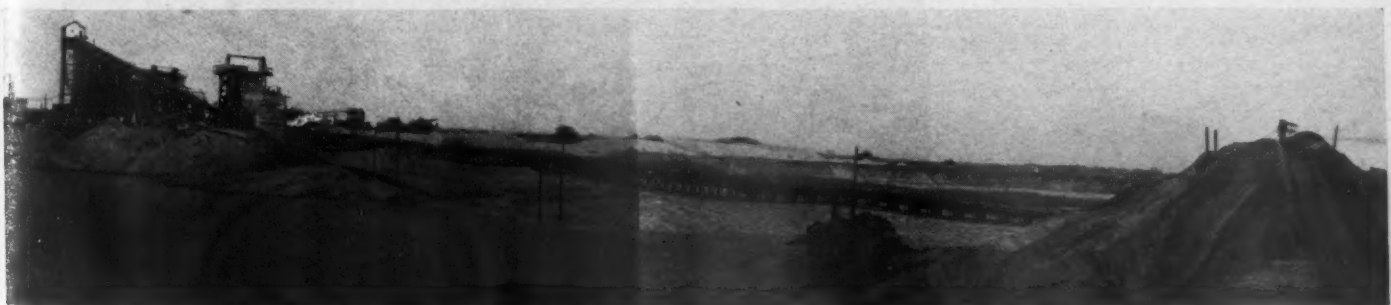


Flexible coupling for vibrating screen

as a flexible coupling acts much like a universal joint, inasmuch as it permits a great angularity. Some of these couplings have been in continuous service for six months and during that time have given no trouble at all. These couplings as shown on the attached sketch were made in our own shop of four flanges turned from cold rolled shafting. These flanges were fastened to a shaft, and to each flange was bolted with elevator

Suspended Conveyor Saves \$1,500 in Gravel Operation

SPANNING several hundred feet of water on property of the McGrath Sand and Gravel Co., Pekin, Ill., a suspended belt conveyor has been installed to bring gravel into the plant from the opposite bank. The shallow deposit is being worked by a 3-yd. Sauerman scraper excavator unit. The



Temporary suspension conveyor and dragline operation at plant of McGrath Sand and Gravel Co., Pekin, Ill.

Producer Makes Special Mixture for Calcium Chloride Treated Road Surfaces

TO the ready-mixed concrete and bituminous mix plants of aggregate producers and their subsidiaries has been added another mix and a plant for making it—premixed gravel, sand, silt and clay for calcium chloride treated secondary roads. Most of the literature on the use of calcium chloride for binder of gravel roads relates to its use on roads already built—it is thought of mostly as a dust layer.

It follows, naturally, that there must be a special mixture of gravel, sand and other ingredients best adapted to give satisfactory results with calcium chloride. Uniform distribution of the various sizes of aggregate is an important factor, just as it is in the case of concrete or bituminous binder roads. The most common practice in obtaining a stabilized mixture of uniform texture is to blade the constituents back and forth across the road. When the materials are dry, difficulty in obtaining uniformity is encountered due to the tendency toward segregation of the aggregate from the soil fines. Moistening the materials slightly prior to mixing has overcome this difficulty in many instances.

An experiment was tried by the Quillan Bros. Construction Co., Lodi, Ohio, in co-operation with the Columbia Alkali Corp., Barberton, Ohio, which proved to be a satisfactory way to obtain a uniform texture. The city of Lodi had a street two blocks in length upon which it was desired to build a 3-in. stabilized slab. At the Quillan Bros. gravel pit there was available graded, washed, crushed, gravel; washed sand; and a source of good quality clay. It was found that 2 cu. yd. of crushed gravel, 1 cu. yd. of washed sand, and 1 cu. yd. of clay gave a mixture which met the specifications of a stabilized road. The above proportion of materials were mixed at the gravel pit by placing them in a pile, and by means of a crane and bucket were picked up and turned over until a uniform texture was obtained. The materials were moistened during the mixing. This premixed stabilized material was then loaded on trucks and carried to the project where it was uniformly spread to a depth of from 4 to 5 ins. Traffic was then allowed on this loose mixture and in a short time it was well compacted. During

compaction by traffic the street was kept smooth and a crown of $\frac{1}{8}$ in. per ft. maintained by means of a maintainer. One and one-half pounds of calcium chloride was applied per square yard after the road was compacted. This was used to keep the street firmly bound and in a dustless condition.

(Continued on page 51.)



(1) In right and left foreground are shown fine and coarse aggregates, in the background clay and sand

(2) Pit

(3) Proportioning bins

Quarry Operator Invents Novel Truck Skip

Hook-On Units Save Expense in Handling
Volume of Heavy Materials for
Indiana Company

A NEW ADAPTATION of the truck skip principle is in effect in the operation of the Muncie Stone and Lime Co., Muncie, Ind. Application of this general method has long been used where the main materials-handling takes place inside plants. Level floors, ample warehouse space and the development of standardized truck and skip units for interior work have made for great efficiency. The complications confronting users of skip methods in outdoor operations, however, have limited progress in this field to cases where the operators' ingenuity has been equal to it.

Scott D. Milligan, vice-president of the Muncie Stone and Lime Co., and E. T. Milligan, secretary-treasurer, are convinced that truck skip practice as developed in their plant is responsible for a definite savings. With several of the new skips, invented by Scott D. Milligan, and claimed now to be perfected for regular commercial service, only one truck is required. With this equipment, they say, as much work can be accomplished as could be done with several trucks. Cash savings come not only from the scaling down of truck purchases but from elimination of maintenance on several truck units each provided with driver.

The truck which tends the several skips used in the Indiana operation (see illustrations) is equipped with a hoist attached to a frame. This combination works the same as an ordinary dump truck unit.

The frame is so made that it will work in conjunction with hoist and skip; when truck moves forward or backward, the op-

eration of loading and unloading material is completed.

Skip design and truck operation in connection with the skip units were all worked for quarry work on the company's property at Muncie. The inventor believes there is room for wide use of his skip and method in the rock products field, and already patents have been applied for. One of the features

Newly developed truck skips in action at plant of Muncie Stone and Lime Co., Inc., Muncie, Ind. From top to bottom, illustrations show skip in quarry with motor truck ready to hook on; the hook-on at rear of truck and front end of truck; truck in motion with skip loading; skip load on truck ready to go; load on way to crushers up 10 per cent grade; dumping load from skip—same as ordinary dumping operation—but skip still remaining with truck; truck with skip unloaded in quarry for another load of stone

stressed as a signal advantage insofar as quarry work is concerned is the loading level of the skip. In loading by hand, efficiency is aided by the fact that the skip, in loading position, is right on the ground. It is much more easily and quickly loaded than is a high-bodied dump truck.

(Continued from page 50.)

This method of construction is limited, as are all others, to its range of practicability. Where premixing can be economically used, there are several advantages. First, selected materials can be used with a better control on the necessary proportions. Second, the problem of dry weather construction is eliminated. There is no expense of hauling water and sprinkling the material as should be done when mixing dry materials on the road. Third, a better control can be had on the uniformity of mixing.

If a 4-in. compacted stabilized slab was to be constructed on a mile of road 20 ft. wide, the following quantities of material would be needed assuming it to weigh 120 lb. per cu. ft.:

Aggregate (through 1 in. on No. 10 sieve).....	472 tons— 45%
Coarse sand (through No. 10 on No. 40 sieve).....	324 tons— 15%
Fine sand (through No. 40 on No. 270 sieve).....	432 tons— 20%
Silt and clay (through No. 270 sieve)	432 tons— 20%
Total	2,160 tons—100%

If such a mixture was prepared by crushed stone or gravel producers, it would give them an outlet to profitably use their fines. If a contractor constructing a stabilized road could purchase such a mixture, he could finish a project quickly. The contractor and highway engineer would have assurance of a uniform mixture and could have a standard material available for secondary road construction.



From Rock Products' Readers

"Capacity of the Cement Industry"

THE EDITOR: Mr. Mallory's comments (ROCK PRODUCTS, May, 1934, page 39) on the article "Capacity of the Cement Industry" (ROCK PRODUCTS, March, 1934, pages 33-5) should prove valuable to all interested in cement. I particularly appreciate the data on capacity which he presents in the last paragraph of his discussion.

In self-defense, however, I must protest against his misinterpretations of the original article. In the first place, I had no idea of reaching any "conclusions." The article was prepared merely to summarize existing data on capacity of the cement industry and to point out what I considered to be interesting relationships. Far be it from me to believe that by manipulation of statistics I could arrive at conclusions regarding so vital a problem as capacity of the cement industry.

The most glaring inaccuracy in Mr. Mallory's discussion is the reference that clinker production for August, 1928, has been set up "as the yardstick by which to measure the total capacity of the industry." Certainly that was not my intention and I believe that everyone who reads the article in addition to the "Editor's Note" will not gather this impression. In Table I statistics relating to capacity of the cement industry are summarized for the years 1925 to 1932, inclusive. To bring out various ramifications of production-capacity relationships, calculations involving peak month production records were tabulated. It happened that 1928 was the year selected as the example to describe the data in the table. August, 1928, has no other significance. If 1930 had been selected as the example, discussion would have centered on clinker production during May, 1930, which incidentally appears to be the peak month reported in Bureau of Mines statistics.

The figure of 178,515,000 bbl., referred to by Mr. Mallory, is not an "estimate" of any kind. It simply is clinker production of the peak month during 1928 multiplied by 11. It was intended to represent the output which the industry definitely proved it could produce during 1928, not the ultimate capacity. I accept Mr. Mallory's rebuke that calculations based on 11-months' operation may be too conservative. Figures for 12 months as well as 11 months were included in Table I.

The only item in the original article which resembles an estimate of total capacity of the industry appears in Table 3, column 7. This figure is 225,900,000 bbl., which seems to correlate reasonably well with the production records of 211,739,000 bbl. and 244,388,000 bbl. mentioned by Mr. Mallory. Even this figure is not intended as a definite estimate, for in discussing its relation to the Bureau of Mines capacity records the statement was made that it was "of little significance because of the arbitrary calculation involved."

The purpose of Table 3 was to show production-capacity relationships among the 12 districts in the industry.

I regret that Mr. Mallory received erroneous impressions in reading the article, and I should be deeply concerned if I thought others had formed similar opinions from it. Fortunately, favorable comments have been received from other sources. Frankly admitting its limitations, the article has served a good purpose in bringing forth Mr. Mallory's views which rightly are highly respected not only in the cement industry but throughout the business and financial world.

H. HERBERT HUGHES.

Washington, D. C.,

May 8, 1934.

* * *

Thank You! Mr. Mocine

The Editor: While your journal is greatly appreciated in its entirety, I believe a special word of appreciation is due you for the front cover editorials.

They always say what so many of us feel, but cannot so well express, that I, for one, feel under great obligations to you.

Criticism expressed by you is always honest, pertinent and constructive, and you are undoubtedly doing the various industries covered by your publication a great service.

JOHN MOCINE.

Sonora, Calif.,

May 5, 1934.

* * *

Washington Comment

The Editor: We thought your article "Chance to Make a Profit, As Well As Credit, Is Present Need" was very much to the point, and all to the good. We don't usually have time to more than glance at the magazine, but this frontispiece article was so full of interest that we even read one or two of the feet inside.

The part about this NRA business that gripes us is not the forced shortening of hours, and the artificial boosting of wages; those two features have considerable elements of merit in them; but it's the tendency toward forcing us into unionization that gripes us the worst. Those birds there in Washington don't realize how difficult it is to maintain a smooth running and efficient plant if you can't hire and fire on a merit basis. We haven't really been hurt any on this score yet, but some of the chatter they put out makes us feel a little pessimistic.

"West Coast Lime Superintendent."

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Causes of Air Receiver Explosions

The Editor: In the February issue of ROCK PRODUCTS, p. 59, is a picture of an air-receiver installation. The receiver is a horizontal tank with the air inlet and outlet

in the top of the shell. The editor who took the picture is of the opinion that this method of piping may prove dangerous because the receiver is not "air-swept," and it . . . "acts as a pocket and might permit the accumulation of heavy explosive gases in its lower portions."

Let us first review the causes of air-receiver explosions. No doubt, some receivers have failed because they were not strong enough to withstand the operating pressure. There is no mystery about this kind of failure. Others have failed from repeated flexure of the small "knuckle" curve that joins the large radius of the head to its riveting flange. In the old style head, now being eliminated in steam-boiler practice, the radius of the knuckle may be as small as 1.5 in. which, in the case of such large tanks as used in compressed air practice, causes extremely high stresses in the knuckle. Also, the tensile stress in the head has a radial component in the end of the shell, which produces high compressive stress at that point. And if the shell is not truly circular (in the majority of cases it is not), there are set up transverse stresses that further complicate matters. Furthermore, the rapid fluctuation of pressure to which many air-receivers are subject, increases the number of flexures per unit of time, and shortens the life of the receiver. compressed-air practice should borrow from steam-boiler practice the elliptical head that is coming into general use.

Another cause of failure is due to the explosion of a mixture of oil vapor and air. Oil is necessary, of course, to lubrication of the cylinder of the compressor, but, on the principle that if a little is good a great deal is better, there is a tendency to use too much. The excess oil is carried into the receiver suspended in the air, or is carried in as a vapor during times of high temperature sometimes attained. Oil vapor of itself is not dangerous—it must be mixed in correct proportion with air. And then there must be the means of igniting the explosive mixture.

The only mysterious factor in air-receiver explosions is the means of producing the ignition temperature. One explanation, always offered, is that leaking valves permit a quantity of high-pressure, high-temperature air to return to the cylinder and be re-compressed until an ignition temperature is reached. This explanation can be dismissed when the effect of several re-compressions are determined. Also, if this were a factor there should be more evidence of it in practice, since perfectly tight valves and piston-rings are not common.

Still another cause of failure is by fire. The oil in the receiver may be ignited, and the mixture of vapor and air being too rich to explode, may merely burn; furiously,

however, because of the density of the oxygen of the air. The plate of the receiver is weakened by the heat, and being no longer able to withstand the pressure, "let's go." There have been similar failures.

In the August 31, 1929, issue of *Rock Products*, I offered my own explanation of the high temperatures sometimes attained in compressed-air practice. It involved the possible adsorption of hydrogen-sulphide by the coke formed by decomposition of the oil, resulting in high temperature; the dense condition of the oxygen, which lowers the ignition temperatures, and a catalytic effect.

Whatever the cause of ignition, disaster can be averted by reducing the quantity of

oil to that necessary for proper lubrication. And rather than depend entirely on manual operation, have the receiver drained of its accumulation of water and oil by means of a trap. The required capacity of the trap would be less than a gallon of water per 1,000 cu. ft. of free air compressed.

The idea that there can be "pockets" of explosive gases in a receiver is a mistaken one. If heavy gases settled out of a mixture then animal life as at present constituted would quickly perish in a blanket of carbon dioxide that would envelope the earth. If the various gases and vapors that make up the contents of the receiver were introduced separately, they would be uni-

formly mixed in a few seconds under the action of diffusion.

There need be no concern about the method of piping the receiver under discussion—it is quite satisfactory. If I were called upon for a refinement, I would suggest that receivers of this type have the air inlet in the middle of one end, with the pipe reaching to nearly the other end. Then with the outlet in the top of the shell at the inlet end, the larger part of the entrained water would be thrown out of the air, and during its slow passage back through the receiver, the separation would be completed. —C. O. SANDSTROM, Thermal Engineering Co., Los Angeles, Calif.

Editor Shaw's Comments from Los Angeles

BUILDING in Los Angeles is coming back fast; faster even than those not directly interested have suspected. This is shown by the sales of ready-mixed concrete which were given me by one of the largest companies. In February of this year they were about 20% of what is considered the normal capacity of the plants. In March, sales jumped up to nearly 40% and in April to around 65%. And the prospects for future work are so good, with much of the concrete contracted for, that it will not be surprising if the May record reaches the full capacity.

Sales of aggregate are rising in a parallel curve, although of course nothing like the full capacity of the plants in this part of the world is going to be reached at any time, if all the obsolescent and worn-out plants are included.

Cement companies have had little to complain of for some time, with Boulder dam and the Metropolitan aqueduct taking so much of their production. In the latter part of April a nice order was divided among the four southern California companies, California, Monolith, Riverside and Southwestern, 1,400,000 bbl. for Hoover dam. The price was \$1.49 f.o.b. plants. And labor as well as ownership has profited by the demand for cement. In April wages were increased 10%, making an increase of 25% in the past year. This order is for the low-heat cement that is being used to a great extent on the public works of the Pacific Coast.

To judge by the rise in current prices, the demand for almost all the standard building materials is increasing. The following is part of a table given in the *Los Angeles Times* showing the rise in prices since 1932 as compared with prices in 1923, all approximately as of May 1:

	1923	1932	1933	1934
Common boards, No. 1, M.....	\$48.00	\$21.50	\$22.33	\$39.00
Common brick, M.	15.00	8.00	11.00	11.78
Portland cement, bbl.	3.26	2.30	2.30	2.50

Crushed rock, ton	2.15	1.40	1.40	1.70
Gypsum plaster, ton	18.00	15.20	14.44	17.60
Wire nails, keg..	4.50	2.85	2.40	4.50

The increased demand, and perhaps some other things, has led to the building of four new aggregate plants, rock and sand plants, in the past few months. The Consolidated Rock Products Co. has recently rebuilt its Largo plant. The old Largo plant resembled a modernistic painting, but it ran more steadily than some other plants because its design was adequate and it was not too large to be operated profitably when the demand for aggregate was low and the new plant is built on the same general lines. Then there is the Pacific Rock Co.'s plant at Monrovia, the company being mainly that of the three Rogers brothers, formerly the principal owners of the Union Rock Co., which was one of the larger companies from which the Consolidated Rock Products Co. was made. John Gregg, another old-timer in the aggregate industry, has built a new plant near Roscoe. At this writing it seems probable that at least one and possibly two or three more new plants will be under construction by the time this is published.

I inquired how the new code was working and was told it was as nearly 100% as such things can be. Prices are reported promptly and some of the companies almost lean backward to see that every rule and regulation is held to. This is good news to those who remember the "sand wars" of years ago.

Much of the work of which I have heard is what contractors call small stuff, residences, small business buildings and the like. It is true that there has been a great need for new construction of this kind, perhaps more to replace existing small structures which are unsatisfactory or worn out than to provide for additions to the population. But there is plenty to be done in making the city's streets better and safer, and a considerable amount of such work is now going on. Possibly the biggest job, as this is written, is

the fourth of the North Figueroa street tunnels, which is 700 ft. long and will cost approximately \$400,000. A grade separation bridge at Sunset and Glendale boulevards, replacing a wooden bridge, which has been condemned for some time, will cost \$130,000, and there are improvements to three main highways, including widening, which will cost \$250,000. Probably this list could be considerably extended by the time this is published, as there are many improvements planned and the feeling is that it is better to build now before a greater rise in prices and materials.

Beside the aggregate plants that have been mentioned there are several plants building and to be built to furnish aggregates for the concrete lining of the Metropolitan aqueduct. I was shown some of the plans the other day. Naturally they are simple plants and first cost has to be carefully considered as there is no chance of their being used in the original location after the job is completed. The plans of those I saw had jaw crushers and vibrating or shaking screens.

Determining Crusher Efficiency

I have also seen a study of crusher efficiency that was made for a plant on the aqueduct line, to produce aggregate for a single large job, in this case about 700,000 cu. yd. It illustrates how carefully machinery must be studied before buying if the right machine to fit the conditions is to be secured. The conditions in this case were peculiar. The oversize, plus 2-in. of a gravel deposit, had to be crushed, and it was necessary to crush it so as to make as little as possible passing 1-in., for the deposit had much more than was wanted of such material. Of course questions of first cost, power cost and upkeep had to be balanced against the cost of added excavating and handling of pit material and of wasting the unwanted portion of the product before the actual efficiency of the machine was determined, and all this was done in great detail.

The result showed a difference of \$30,000 between the actual crushing cost for the

crusher making the least fines and that making the most fines, enough to pay for any one of the crushers several times over. As I remember, the best rated crusher made only 18% of minus 1-in., while the poorest rated made almost 50% of this size. But in another case the rating might have been exactly reversed because the crusher chosen was the least efficient judged by mesh tons per horsepower hour. The crusher ratings were obtained from representatives of crusher manufacturers, samples of the rock having been submitted to them.

This goes to show what the writer has long believed, that there is no "best" machine of any kind on the market. As in the case above described, the machine having the least efficiency from one point of view may have the greatest efficiency from another. Altogether too much money is spent because machines are so often bought because of a prejudice in favor of, or against, a certain type. The same engineering knowledge that is applied to the design of plants and their operation should be applied to the purchase of machinery more often than it is.

Construction Outlook

THE IMMEDIATE OUTLOOK for the construction industry, from an earnings point of view, for the next few months is quite favorable, according to a recent bulletin, "Standard Trade and Securities," published by the Standard Statistics Co., New York City. This company's survey shows that the NRA codes have appreciably improved competitive conditions, indicating the probability of price maintenance at remunerative levels. Longer term prospects are also promising, although not definitely predictable. It is not anticipated that private construction will soon develop enough to absorb the deficit that will follow withdrawal of the Federal government from the public works construction field.

Attention is called to the fact that some of the recent increase in value of construction contracts let is due to increased costs of building materials and labor as well as greater volume of building—from 40 to 50% of the alleged increase in residential building is so accounted for. However, it is not believed that building will be delayed by alleged high costs, because there is no prospect that costs will be less in the future. Efforts to reduce the high wages of building trades labor, in spite of the fact that it has been unemployed for several years, meet with little success—increases are being asked in numerous instances.

The chief hope of the construction industry, for some time to come, according to these analysts is in revival of the residential and industrial fields. Commercial buildings—offices, etc.—are still considered in excess of demand for space. In the residential field, however, there are definite signs of releasing a long pent-up demand; and rapid progress in industrial development is held to make for rapid obsolescence of both plant and equipment. It is also claimed that there is a large accumulated need for repair and maintenance work; the majority of rehabilitation operations will be small and will not be reflected in building statistics, but the collective effect on demand for building materials and supplies should be substantial.

Government assistance in financial residential construction and repairs is confidentially looked for, and the possibility of continued

Federal public works on a somewhat reduced scale.

Cement and lumber are particularly mentioned as in line for the most widespread gains. The following comment on the cement industry is interesting: "In the cement industry, alone, does there appear to be a possibility of a weakening of sales quotations. This uncertainty results principally from the fact that enactment of the reciprocal tariff measure would empower President Roosevelt to reduce cement tariffs. Exercise of this right would encourage the importation of low cost foreign cement and would tend to demoralize seaboard markets, which normally take a portion of the output of interior plants. Thus far this danger is intangible, and it appears likely that the active opposition of the industry will prevent any action that would seriously impair company profits."

Another Possible Source of Lightweight Aggregates

A POSSIBLE SOURCE of lightweight aggregate was discussed in a recent article by H. Herbert Hughes in *Mining and Metallurgy*. After reviewing the development of lightweight aggregate and the several materials now being used for this purpose he points out that the possible development of production of electric power at mines may result in the accumulation of a large quantity of cinders.

Investigation is being carried on to determine the most satisfactory cinders for use as aggregate, and with large power plants it would be practical to control combustion in a way to produce cinders meeting the requirements for a high-grade aggregate. These cinders would become an important byproduct which might tend to increase the feasibility of profitable production of power at mines.

Another possibility is the preparation of mine-mouth or breaker waste to meet requirements for lightweight aggregates. Investigation in this regard has been carried on by the Lehigh Navigation Coal Co. and results with the Lytag process have produced satisfactory lightweight aggregate.

The company has also developed a product which resembles aggregates in the lightweight group. The method of manufacture of this product is not known except that the process uses a Coxe traveling grate with an especially thick bed and a high draft. No name has been given this aggregate nor have plans for commercial production been announced, but results of the preliminary research have apparently been encouraging, Mr. Hughes states.

An estimate of past consumption of lightweight aggregate for all types of building construction places the average annual consumption, based on a five-year average, in excess of 2,825,000 cu. yd. This is probably less than 3% of the total aggregate consumption of the country.

In the article it is pointed out that coal producers maintain a sales organization contacting dealers who frequently handle building material as well as coal, and that certain economies might result by the addition of a new product which an established sales organization might handle.

It is also pointed out that plant location for such utilization of mine waste would be an important consideration in view of the fact that transportation costs are an important item in the cost of aggregate. The possible use of this breaker waste for the manufacture of roofing granules in which brilliant colors are desired is also suggested.

Administrative Interpretations Clarify Aggregates Code

JUDGING by *Information Bulletin* No. 4, issued by the Code Authority of the Crushed Stone, Sand and Gravel, and Slag Industries, excellent, though necessarily slow, progress is being made in ironing out differences of opinion as to the meaning of some of the code prohibitions. Here are some of the rulings or official interpretations by NRA:

The code permits movement of a plant from one location to another within a permissive area.

A producer may not disclose in advance a cut price he proposes to post, for the purpose of taking a contract from his competitors.

A producer must file his price even where he merely meets the posted market price of a competitor; the five-day notice is not required, as the effective day of the posted price is set by the competitor.

A producer may sell for less than his prime cost plus 10% to meet a competitive price, but his competitor must always sell for not less than his own prime cost plus 10%. In other words, a low cost producer can (and probably will in most cases) set the market price, and competitors will have to get their costs down to his level, or take the business at a loss.

Digest of Foreign Literature

By F. O. Anderegg, Ph. D.
Consulting Specialist, Pittsburgh, Pa.

Calcined Tuff for Portland Cement.

Yoshiaki Sanada made a series of burns to compare with the effect of precalcination of a tuff raw material on the properties of the resulting portland cement made from a raw mix of limestone, tuff and copper slag. While the tensile strength of the cement made from the calcined tuff-rock showed only a slight increase over similar cement made from uncalcined rock, the compressive strengths of the former were appreciably greater than those of the cement made from uncalcined tuff. Using a coaly shale having about 70% ash, best results were secured with one part of coal shale to 4 parts of tuff for the precalcination. *Journal of the Society of Chemical Industry, Japan* (1934), 37, No. 1, p. 5B; No. 2, p. 62B.

Cold Glazes for Cast Stone Products.

The problem of producing a glossy surface on cement products is discussed by Willi Serkin. At times it is possible to get a fairly good result by polishing, especially if a fluosilicate is used as hardener. Again by spraying mixtures of cement, and here the aluminous cements give very fine results, on a highly polished metal or glass surface and backing with mortar after the initial set has been reached, an effect like a very high polish may be secured. Mixtures of resieved cement with a waterproofing material, such as potassium oleate, and glossy admixtures, usually with the addition of about 2% calcium chloride, can be sprayed upon the surface of the cement product. The gloss is increased by coating with a transparent lacquer, which would not be affected by the alkalies in the cement. A cellulose lacquer is suggested for this purpose. Or such a lacquer can often be added directly to the concrete surface if the latter has a satisfactory appearance, whereby considerable gloss is added. Certain of the resins, like Bakelite, harden on heating at comparatively low temperatures to produce hard, glossy surfaces, and can often be used to advantage. The author suggests that some of these treatments are more apt to succeed on aluminous or blast furnace cement products than on portland cement bases. It is important to keep the cement products so treated dry, because of the detrimental effect of moisture thereupon. *Tonindustrie Zeitung* (1934), 58, No. 17, p. 210.

Testing of Building Materials for Weather Resistance. The chief agent in deterioration of building materials is moisture, which by leaching, swelling, freezing, bringing in corrosive acids and salts, promoting crystal growth, shrinkage, and through other, more obscure effects contributes to the millions of dollars worth of damage

every year. In addition, temperature changes are important. The wind and wind-driven sand, and occasionally the effect of animal or plant life, are minor factors. In testing building materials prolonged periods of actual exposure are most satisfactory for drawing conclusions, but the obvious desirability of obtaining information at earlier periods has resulted in much thought concerning suitable methods of test. A variety of physical and chemical properties have bearing on weather resistance and knowledge of these is often readily obtainable and combining this information with previous experience a fairly satisfactory prediction of the probable durability of a given material can often be made.

Measurements of porosity, absorption and absorption rate and of the character of the bond between grains are of great value. The weakening effect that soaking in water, or from temperature changes, or due to repeated freezing and thawing, or to crystallization of salts within the material, give important information. Many of the effects of these factors can be followed, visually with the aid of a microscope, by strength determinations and by abrasion measurements. For the latter a sand blast, as well as an actual rubbing of some kind, are useful. This subject has been discussed by Ing. Annemarie Schmölder in *Tonindustrie Zeitung* (1934) 58, No. 24, p. 303; No. 25, p. 318.

Passage of Water as a Means of Investigating Corrosion Phenomena in Mortar. The complicated nature of the hydration products of portland cement having interfered with previous attempts to determine the mechanism of the reaction of corrosive solutions on portland cement products, a more logical method of investigation has been worked out by Hans Kuhl, J. Perga-Pondal and S. Baentsch. The specimens used were small cylinders formed by pressing 1:3, 1:5 or 1:8 mixes with 10% water added. The sand was German standard sand ground for ten minutes in a small mill to secure a graded sand without too great a pore space. The cylinders were cured in water or in air for various periods or in combined storage (7 days wet and 21 dry), the weight changing according to the method of storage.

They were then placed in a funnel with the aid of rubber tubing for the percolation experiments using water under a head of 70 cm. The water was collected and analyzed. The method of storage had a great deal to do with the permeability, the presence of water having caused the cement to hydrate and expand and fill many pores. Those specimens which, by virtue of lean mix and dry storage were quite porous, allowed the water to pass through, readily resulting in leach-

ing out of considerable cement and consequent greater porosity. With lesser porosity, the leaching water by being imbibed into the cement gel already present and by promoting further hydration, tended to close the pores.

The result of water flows to leach out alkalies early in the game unless they had already been removed during wet storage. Along with the alkalies some sulfate was extracted, but in their absence little could be removed because of the very low solubility of calcium sulfoaluminate. Lime was leached out somewhat slowly, resulting in loss of strength. It varied greatly, according to the history of the gel; from those specimens stored in water, with a softer gel, lime was more readily removed than from well dried specimens. The carbonation of part of the lime in the latter afforded considerable protection. Presence of alkalies protected the lime to some extent, also alumina and iron oxide were not found in the permeate, but where the alkali content was high and the lime low in the leach water, appreciable traces of silica were observed. The authors believe this method offers considerable promise for investigating the mechanism of the corrosive disintegration of concrete. *Zement* (1934, 23, No. 6, p. 69; No. 7, p. 84; No. 8, p. 100; No. 9, p. 116; No. 10, p. 127; No. 11, p. 141).

Effect of Salt Solutions on the Setting and Hardening of Portland Cement and Its Mortars. R. Grün and H. Manecke have contributed a careful study of the effect of a variety of chlorides and sulfates upon the speed of setting and hardening of portland cement. The results obtained confirm well established principles covering the effect of the sign and charge on various electrolytic ions upon the coagulation of colloidal systems. As portland cement is a colloidal system after hydrating, of a negative character, it is not surprising to find that double and triple charged positive ions speed up the set, while negative ions bearing two or three charges have an opposite effect. At the same time, and in common with many colloidal systems, many ions have specific actions. With portland cement the aluminum, calcium, ferric and magnesium ions are quite active in speeding up the setting reactions, while the sulfate ion slows down the setting processes quite appreciably. The latter effect rises to a maximum and then falls off again. In regard to strength, calcium chloride often increases strengths after 12 to 24 hours, while with aluminum chloride this effect, with the particular cements used, only became appreciable after about the third day. *Tonindustrie Zeitung* (1934) 58, No. 21, p. 264; No. 22, p. 276.

TRAFFIC and TRANSPORTATION

Proposed Rate Changes

THE FOLLOWING are the latest proposed changes in freight rates up to and including the week of May 19:

New England

32515. Common sand and gravel, minimum weight 60 net tons, Gleasondale (T), Mass., to Revere, Mass. Present, 70c; proposed, 40c. Reason: To enable the rail carrier to secure the haul on material which will otherwise be furnished by barge.

Trunk

Sup. 1 to 32256. Stone, rip rap, rubble (river filling), C. L., in open top cars (See Note 2), from Opekiska, W. Va., to Charle-roi, Penn., \$1.39 per net ton.

32309. Crushed stone and screenings, C. L. (See Note 2), from Kaylor, Penn., to stations in Pennsylvania, Beatty, Brockway, Cabot, Corydon, Driftwood, Erie, Indiana, McKeesport, Pittsburgh, Roystone, Sligo, Struthers, Templeton, Union City, West Line, Cecil, and various, rates ranging from 70c to \$1.40 per net ton. Rates to expire December 31, 1934. Reason—Proposed rates are comparable with rates from East Brady, Penn.

32310. Sand, other than blast, engine, fire, foundry, glass, molding, quartz, siliceous or silica, and gravel (except molding gravel), C. L., (See Note 2), from Hopatcong Junction and Kenvil, N. J., to L. V. R. R. stations Penn Haven Jct., Quakake, Beaver Meadow, Ebervale, Driftwood, Harwood Jct., Stockton, Delano, Lost Creek, Ashland, Tannery, Avoca, Wilkes-Barre, Pittston, Barbertown, West Pittston, Wyoming, Kingstons, Schuylkill Haven, Lehigh Gap, Packerton, Penn., and various, rates ranging from \$1.20 to \$1.60 per net ton. Reason—Proposed rates are comparable with rates on like commodities for like distances, services and conditions.

32311. Crude or crushed fluxing limestone, C. L. (See Note 2), from Bellefonte, Penn., to Berwick, Penn., \$1.50 per gross ton. Present rate, 16c per 100 lb., 6th class. Reason—Proposed rate is comparable with rate from Bainbridge to Berwick, Penn.

32319. Limestone, ground or pulverized, and limestone dust, C. L., minimum weight 50,000 lb., to all points on Danville and Mt. Morris R. R., from Jamesville, N. Y., \$2.20, and from Jordanville, N. Y., \$2.80 per net ton. Reason—Proposed rates are comparable with rates on like commodities for like distances, services and conditions.

32362. Broken stone, C. L. (See Note 2), from Foxcroft, Penn., to East Bloomsburg, Penn., \$2.20, and Bloomsburg, Penn., \$2.40 per net ton. Reason: Proposed rates are comparable with rates to South Danville and Danville, Penn.

32363. Ground limestone, C. L., minimum weight 50,000 lbs., from West Rutland, Vt., to stations Port Bowkley, Penn., to Tunkhannock, Penn., Tagues Eddy, Penn., to Wysox, Penn., and Monroeton, Penn., to Bernice, Penn., 16½c per 100 lbs. Reason: Proposed rates are comparable with rates on like commodities for like distances, services and conditions.

32369. Limestone, ground or pulverized, and limestone dust, C. L., minimum weight 50,000 lbs.

From Jamesville, N. Y., to	Prop. rate
Norfolk, N. Y.	240
Raymondville, N. Y.	240
Chase Mills, N. Y.	240
Waddington, N. Y.	240

From Jordanville, N. Y., to	Prop. rate
Norfolk, N. Y.	255
Raymondville, N. Y.	255
Chase Mills, N. Y.	255
Waddington, N. Y.	255

Proposed rates per net ton. Reason: Proposed rates are comparable with rates on like commodities for like distances, services and conditions.

32377. Crushed stone, C. L. (See Note 2), from White Haven, Penn., to Mauch Chunk, Penn., 44c per net ton, to expire September 30, 1934, and effective October 1, 1934, rate of 70c per net ton to apply.

M-3226. (Increase) (carrier)—To increase the rate of 80c per net ton to 90c per net ton on sand and gravel, C. L., from Carpenter-ville, N. J., and Portland, Penn., to Allentown, Penn.

32290. Sand, blast, engine, molding, glass, silica, quartz or siliceous, C. L. (See Note 2), from South Danville, Penn., to Dickson, Carbondale, Penn., \$1.80, and Hackettstown and Dover, N. J., \$2 per net ton. Reason—Proposed rates are comparable with rates to Manheim, Myerstown, Royersford, Penn., and Corning, N. Y.

32291. To cancel commodity rate of 5½c per 100 lb. on limestone, crude and lump (See Note 2), from Grove and Frederick, Md., to Baltimore, Md., stations, class rate to apply. Reason—Investigation develops that there has been no movement for some time and no prospect of future movement, therefore, rate is obsolete.

32249. Limestone, unburned, ground, C. L., minimum weight 50,000 lbs., from Rosendale, N. Y., to Secaucus, N. J., \$1.75 net ton. Present rate 6th class. Reason—Proposed rate is comparable with rates on like commodities from and to points in this same general territory.

32252. Stone, broken, or rip rap, C. L. (See Note 2), from Bainbridge, Union Stone Co., Pa., and Blumont, Md., to Ocean City, Md., \$1.80 per net ton. Present rate 20c per 100 lbs., 6th class. Reason—Proposed rate is fairly comparable with rates from Baltimore, Md., and York, Penn., etc.

32253. To cancel commodity rates on sand and gravel from Pompton, Plains (Riverdale), N. J., to Arlington, North Newark, East Orange, Orange, West Orange, Montclair Heights and Upper Montclair, N. J., class rates to apply. Reason—Investigation develops no traffic has moved for some time and no prospect of future movement, therefore, rates are obsolete.

32256. Stone, rip rap, rubble (river filling), C. L., in open top cars (See Note 2), from Flagg Meadow and Tice, W. Va., to Charle-roi, Penn., \$1.39 per net ton. Present rate, \$1.64 per net ton. Reason—Proposed rate is comparable with rates from Ellwood Junction to Greensburg, Jeannette, Monongahela, Penn., etc.

Central

36955. (a) To establish on crushed limestone, C. L., minimum weight 60,000 lb., from Danbury, Genoa and Martin, O., to Hamilton and Welland, Ont., rate of 16½c. Present—17c to Hamilton, Ont. (Genoa, O., to Hamilton, Ont., 16½c); 17½c to Welland, Ont. (70% of sixth class).

(b) To cancel rate of 16½c on ground limestone, C. L., minimum weight 60,000 lb., from Rocky Ridge, O., to Hamilton and Welland, Ont., as published in Item 260-A of N. Y. C. R. R. Tariff 133, account obsolete.

36956. To establish on soapstone or talc, ground, crude, in bags, C. L., minimum weight 40,000 lb., from Joliet, Ill., to Dayton, O., rate of 280c per net ton. Routing—Via Chicago, Ill. Present, 23c (sixth class), minimum weight 36,000 lb.

39532. To establish on (A) limestone, fluxing, in open top cars, C. L., and (B) limestone, crude cement, not screened to size, in open top cars, C. L., from Kaylor, Penn., rates in cents per gross ton, to Bessemer, Clairton, Munhall, North Bessemer, Rankin and South Duquesne, Penn., proposed, (A) 75c; present, (A) 84c; Universal, Penn., proposed, (B) 75c; present, (B) 84c. Route:

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

Via W. A. R. R., Queen Jct., Penn., B. & L. E. R. R.

39553. To establish on sand (except blast, core, engine, filter, fire or furnace, glass, grinding or polishing, loam, molding or silica) and gravel, C. L., from Peru, Ind.

To	*Prop.	Pres.
Antwerp, O.	88	14
Knoxdale, O.	88	15
Cecil, O.	88	15
Defiance, O.	88	15
Jewell, O.	88	17
Okolona, O.	88	17
Napoleon, O.	88	17
Blakesley, O.	100	16
Montpelier, O.	105	16

*Route: Via Wabash Ry. direct.

39554. To establish on sand (except blast, core, engine, filter, glass, grinding or polishing, loam, molding or silica) and gravel, C. L., from Peru, Ind., to Ft. Wayne, Ind., rate of 63c per net ton. Route: Via Wabash Ry. direct. Present, 70c per net ton.

39577. To establish on crushed stone and screenings, C. L., from Kaylor, Penn., to points in Pennsylvania (representative points shown in Exhibit A) rates as shown in Exhibit A. Present—As shown in Exhibit A.

EXHIBIT A

From Kaylor, Penn., to (representative points in Pennsylvania):

	Prop.	Pres.
Andrico	110	130
Beaver Falls	100	110
Braddock	90	110
Brownsville	120	140
California	110	130
Corydon	140	150
Cowanstown	80	110
Dotter	90	130
Elrama	100	120
Glyndon	120	130
Greensburg	100	120
Homer City	100	120
Johnstown	110	130
McKeesport	100	120
Madison	110	130
Meredith	100	140
Morganza	100	120
Mt. Pleasant	110	130
Pittsburgh	90	110
Roystone	140	160
Sarah Furnace	80	120
Slickville	90	110
Studa	110	130
Templeton	80	110
Vandergrift	80	100
Washington	110	130

39598. To establish on agricultural limestone and crushed stone, C. L., in open top cars, from Carey, O., to Cortland, O., and Orangeville, Ohio-Penn., rate of 135c per net ton. Route—Via Nor. Ohio Ry.-Copley Jct., O.-A. C. & Y. Ry.-Akron, O.-Erie R. R. Present, 18c (6th class).

39600. To establish on crushed stone and crushed stone screenings, C. L., from Delphos, O., to Willshire, O., rate of 40c per net ton, to expire September 30, 1934. Route—Via N. Y. C. & St. L. R. R. direct. Present, 60c per net ton.

39627. To establish on sand (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) and gravel, C. L., from Peru, Ind.

To	Pres.	*Prop.
Treaty, Ind.	90	70
Lafontaine, Ind.	90	75
Foxs, Ind.	Class	75
Marion, Ind.	Class	80
Bolivar, Ind.	Class	75
North Manchester, Ind.	Class	75
Claypool, Ind.	Class	80
Warsaw, Ind.	Class	85
Leesburg, Ind.	Class	90
Milford Jct., Ind.	Class	95
Haydon, Ind.	Class	95
New Paris, Ind.	Class	95
Goshen, Ind.	Class	100
Elkhart, Ind.	Class	105
Speicher, Ind.	81	70
Urbana, Ind.	81	75

39648. To establish on sand (except blast, core, engine, filter, fire or furnace, glass, grinding or polishing, loam, molding or silica) and gravel, C. L., from Peru, Ind.

To	*Pres.	*Prop.
Simpson, Ind.	12	80
Uniondale, Ind.	12	85
Kingsland, Ind.	12	85
Tocsin, Ind.	13	90
Magley, Ind.	13	90
Preble, Ind.	13	90
Decatur, Ind.	13	95
Rivare, Ind.	14	95
Servia, Ind.	11	85
Bolivar, Ind.	10	85
Akron, Ind.	11	95
Rochester, Ind.	10	100

*Sixth class.

39474. To establish on sand, except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica, and gravel, in open top equipment, C. L., from Gnadenhutten, O. (Rates in cents per net ton):

To	Prop.	Pres.
Birds Run, O.	50	100
Cambridge, O.	60	100
Jewett, O.	60	90
Newcomerstown, O.	40	90
Philadelphia Road, O.	40	90
Piedmont, O.	70	90
Scio, O.	50	90

39518. To establish on sand (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) and gravel, C. L., from Indianapolis, Ind., to Shelbyville, Ind., rate of 35c per net ton. Present rate, 75c per net ton per C. C. & St. L. Ry. Tariff 1703-P.

39367. To establish on sand (other than blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica), or gravel, C. L., from Mantua, O., to Hillsville, Penn., rate of 80c per net ton. Present, 115c per net ton, applicable from Cleveland and Mantua, O., is intermediate.

39374. To cancel rates on stone as described below, published in B. & O. R. R. Tariff I. C. C. 20287, from Elyria and Grafton, O., to destinations in Illinois, Indiana, Iowa, Kentucky, Michigan, Missouri, New York, Ohio, Pennsylvania, West Virginia and Wisconsin. Classification basis to apply in lieu thereof. Description, stone, viz., crushed, tailings, broken, ground, rubble, rip rap, quarry scrap, spawls, dust, silica, firestone, artificial, natural, building, monumental, curbing, flagging, paving, building blocks, boulders, breakwater, lake filling.

39384. To establish on stone, fluxing, furnace or foundry, melting and/or refractory (unburned), in bulk, C. L., from Gibsonburg, Woodville and Maple Grove, O., to Lancaster, O., rate of 113c per G. T. Route: Via P. R. R. Present, 166c per G. T.

39385. To establish on stone, fluxing, furnace or foundry, melting and/or refractory (unburned), in bulk, C. L., and sand (except blast, core, engine, filter, fire or furnace, foundry glass, grinding or polishing, loam or silica), also gravel, carload, from Kenneth, Ind., to Kokomo, Ind., rate of 55c per net ton. Route: Via P. R. R. direct. Present, 70c per net ton.

39386. To establish on crushed stone screenings, C. L., from McCook, Ill., to Terre Haute, Ind., rate of 161c per net ton. Present, 11c.

39402. To establish on sand (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica), and gravel, C. L., from Peru, Ind., to Claypool, 80c, and to Thomaston, Ind., 85c per net ton. Route: Via N. Y. C. & St. L. R. R. direct. Present rate, 13c (sixth class).

39414. To establish on sand (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica), and gravel, C. L., from Indianapolis, Ind., to Fountaintown, Ind., rate of 35c per net ton. Present rate, 75c per net ton.

39678. To establish on crushed stone, C. L., from McVittys and Carey, O., to Allov, W. Va., rate of 185c per net ton. Route: Via C. C. & St. L. Ry., Columbus, O., thence N. Y. C. R. R. Present, 371c per net ton (based on commodity rate \$1.51 to Charleston, W. Va.), plus 6th class, 11c per cwt.

39684. To establish on crushed stone, C. L., from Marengo and Milltown, Ind., to stations on the B. & O. R. R. as shown below, rates in cents per net ton:

To	Prop.	To	Prop.
Edgewood	128	Roland	120
Iola	123	Wells	120
Rifle	123	Ridgway	125
Louis	118	Shawneetown	125
Flora	113	Odin	120
Rinard	113	Salem	120
Cisne	113	Xenia	120
Geff	113	Kenner	120
Hubbard	115	Clay City	115
Springer	120	Noele	115
Enfield	120	Olney	115
Sacramento	120	Bridgeport	115
Norris City	120		

Present, no community rates in effect, class rates apply.

39681. To establish on stone, fluxing, furnace and/or foundry, melting and/or refractory (unburned), in bulk, C. L. (See Note 3), from Ridgeville, Ind. (Rates in cents per net ton.)

To	*Pres.	Prop.
Alexandria, Ind.	240	110
Alton, Ill.	480	210

Anderson, Ind.	240	110
Chicago, Ill.	400	180
Chicago Heights, Ill.	400	180
Dunkirk, Ind.	200	90
Elwood, Ind.	240	110
Evansville, Ind.	460	220
East St. Louis, Ill.	480	230
Gary, Ind.	400	180
Gas City, Ind.	220	100
Hartford City, Ind.	200	90
Indianapolis, Ind.	280	160
Kokomo, Ind.	260	110
Marion, Ind.	240	100
Muncie, Ind.	200	110
New Castle, Ind.	240	110
Shirley, Ind.	240	120
Streator, Ill.	420	210
Terre Haute, Ind.	360	170
Upland, Ind.	220	100
Winchester, Ind.	180	80

*Sixth class.

39698. To establish on sand (other than blast, engine, core, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica), in open top cars, C. L., and gravel, in open top cars, C. L., from Chillicothe, O., to Lathrop, O., rate of 105c per net ton. Present, 300c per net ton (sixth class).

39699. To establish on stone, breakwater or filling (quarry scrap), C. L. (See Note 1), from West Ellwood Jct. and Ellwood City, Penn., to Ashtabula Harbor, O., rate of 90c per net ton, to expire with December 31, 1934. Route: Via P. & L. E. R. R., Youngstown (N. Y. C. Jct.), O., and N. Y. C. R. R. Present, 113c per net ton (applicable on rough quarried, rip rap and rubble stone, per P. & L. E. R. R. Tariff I. C. C. No. 2925).

39702. To establish on limestone, broken, crushed, ground or pulverized, C. L., from Bedford, Murdock and Mitchell, Ind., to destinations in C. F. A. territory—rates the same as applicable on lime, C. L., minimum weight 50,000 lb., illustrations of which are shown in Exhibit A. Present, same as shown in Exhibit A.

EXHIBIT A ILLUSTRATIONS

[Rates in cents per 100 lb., except as noted]

To	Prop.	Pres.
Adrian, Mich.	13½	14
Akron, O.	14	14
Ashland, Ky.	13	12
Battle Creek, Mich.	13½	14
Bellaire, O.	14½	13½
Buffalo, N. Y.	17	15½
Charleston, W. Va.	13½	*\$2.40
Cleveland, O.	14	14
Detroit, Mich.	14½	14
East Liverpool, O.	15	15½
Grand Rapids, Mich.	14	14
Hamilton, O.	10½	9
Lima, O.	12	11½
Pomeroy, O.	13½	12
Saginaw, Mich.	15	15½
Toledo, O.	13	13
Youngstown, O.	15	14½
Evansville, Ind.	9½	8
New Albany, Ind.	8½	7
Terre Haute, Ind.	9	7
Indianapolis, Ind.	9	8
Ft. Wayne, Ind.	11½	10
Logansport, Ind.	11	9½
Kokomo, Ind.	10½	9
Chicago, Ill.	12½	11
Freeport, Ill.	14½	14½
Peoria, Ill.	13	11½
Decatur, Ill.	11	10
Springfield, Ill.	12	10
East St. Louis, Ill.	11½	10
Calro, Ill.	12	11½

*Per net ton, minimum weight 60,000 lb.
†From Mitchell, 6½c.

39724. To establish on stone, crushed (in bulk), in open top cars, C. L., from Toledo, O. (ex-lake), to Ottawa, O., proposed, 90c per net ton; present, 13c per cwt.; Paulding, O., proposed, 95c per net ton; present, 13c per cwt.

39725. To establish on common sand and gravel, C. L., in open top cars (See Note 3), from Navarre, O., to Apple Creek, O., rate of 70c per net ton. Route: Via W. & L. E. Ry., Canton or Orrville, O., and P. R. R. Present, 80c per net ton.

39733. To establish on sand (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding and silica) and gravel, C. L., from Winona Lake to Bluffton and Pleasant Mills, Ind., rates of 95c per net ton. Route: Via P. R. R.-Ft. Wayne, Ind.-N. Y. C. & St. L. R. R. to Bluffton. Via P. R. R.-Decatur-N. Y. C. & St. L. R. R. to Pleasant Mills. Present, 13½c to Bluffton; 14c to Pleasant Mills, Ind.

39734. To establish on stone, fluxing, furnace or foundry, melting and/or refractory (unburned), in bulk, C. L., from Gibsonburg, Woodville, Maple Grove, O., and other points grouped therewith, to Auburn, N. Y., rate of 250c per net ton. Present, 520c per net ton.

39737. To establish on sand (other than blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) or gravel, C. L., from Cleveland, O. Rates in cents per net ton.

To	*Prop.	Pres.
Meadville, Penn.	110	175
Franklin, Penn.	120	175
Oil City, Penn.	120	175
Reno, Penn.	120	175

*Cars loaded by dock machinery owned and controlled by the railroads, a charge of 11c per ton will be made in addition to the rate. Rates to apply only on shipments in open top cars.

39739. To cancel rate of \$1.99 per net ton on crushed stone, slag, and/or gravel, coated with oil, tar or asphaltum, C. L., from Kenton, O., to Point Pleasant, W. Va., for B. & O. R. R. delivery published in Erie R. R. Co. Tariff I. C. C. No. A-7191, class rate to apply in lieu thereof.

39747. To establish on crushed stone, crushed stone screenings, and agricultural limestone, in bulk, in open top cars, C. L., from Spencer, Ind., to Marion, Ind., rate of 125c per net ton. Route: Via P. R. R. direct. Present, 17c.

Southwestern

3308. Silica sand in box cars, between points in Kansas and Missouri, on one hand, and points in Louisiana and Texas, on other hand; also from Illinois and Wisconsin points to Louisiana and Texas. To amend Item 250, S. W. L. Tariff 162-G, by canceling paragraph (e) of the exceptions. The foregoing will automatically provide for rates from the Ottawa, Ill., district on silica sand in box cars account Item 535, S. W. L. Tariff 162-G, providing that rates therefrom on silica sand in box cars will be 87c per ton higher than from St. Louis, Mo.

3359. Sand, gravel, crushed rock, etc., from and to points in Arkansas, Kansas, Louisiana, Missouri, Oklahoma and Texas—rule for furnishing equipment. To establish the following rule in S. W. L. Tariff 162-G: "When a shipper orders a car of 80,000 capacity or less marked capacity, and the carrier is unable to furnish car ordered and furnishes a car of greater capacity than ordered, the minimum weight for the car furnished shall be that which would have obtained had an 80,000 capacity car been ordered, furnished and used."

Western

41-2. Rates, limestone, crushed or ground (See Note 3), but not less than 40,000 lb., from Omaha, Neb., to Nortonville, Kan. Rates, present, 206c per net ton (a). Proposed, 9c per 100 lb. or 180c per net ton of 2000 lb. (a) Atchison, Kan., combination.

41-3. Rates: Sand and sand pit strippings, C. L., as described in Item 5390 of W. T. L. Tariff 5a-O, from Browntown, Wis., to Iowa City, Ia. Rates: Present, 12c per 100 lb.; proposed, 9c per 100 lb.

41-4. Rates: Stone, crushed, C. L., minimum weight as now provided in W. T. L. Tariff 237-A, from Jungs, Mo., to St. Charles, Mo. Rates: Present, 50c per ton of 2000 lb.; proposed, 1250c per car.

E-41-7. Rates, limestone, agricultural, ground or pulverized, in bags, barrels, or in bulk, for soil treatment, C. L. (See Note 2), from Quincy, Ill., to points in Iowa and Missouri (joint line). Rates, present, no basis in effect for joint line hauls except class or combination of locals. Rates in cents per 100 lb.

Miles	Prop.	Miles	Prop.
40	79	150	135
50	83	160	139
60	87	170	143
70	91	175	145
80	96	180	147
90	105	190	151
100	110	200	155
110	116	210	160
115	120	220	161
120	122	225	170
130	130	240	170
145	135	250	175

E-41-8. Rates, stone, crushed, C. L. (See Note 3), but not less than 50,000 lb., from Louisville, Neb., and Weeping Water, Neb., to Witten, Mosher and Wood, S. D. Rates, present, class or combination rate. Proposed, to Witten, S. D., 16c; Mosher, S. D., 17c; Wood, S. D., 18c per 100 lb.

Rock Products News Briefs

Recent Contract Prices and Prices Bid

Springfield, Ill.: State Highway Department recently bought 165,000 bbl. of portland cement at a delivered price of \$1.84 per bbl.; 120,000 bbl. went to the Marquette Cement Manufacturing Co., Oglesby, Ill., and 45,000 to the Medusa Portland Cement Co., Dixon, Ill.

Schenectady, N. Y.: Bids for the purchase by the City of Schenectady of 10,000 tons of gravel were thrown out by the board of contract and supply following the withdrawal of Lattanzio Brothers of their low bid of 57¢ a ton. Lattanzio Brothers withdrew their bid because they had unknowingly violated the NRA code of fair competition requiring posting of their bid five days before it was opened by the city. The district committee of the code, in a letter to the city engineer, LeRoy C. Purdy, advised that the city reject the bids and readvertise for new ones because of the confused knowledge of the code in the minds of building supply men. The resolutions rejecting the bids called for new ones to be opened on May 23.

Knoxville, Tenn.: Contract was awarded by the Tennessee Valley Authority for the sand and gravel to be used in building General Joe Wheeler dam. The order, placed with the Cumberland River Sand Co., Nashville, Tenn., calls for between 1,000,000 and 1,250,000 tons of sand and gravel, at 89½¢ a ton, delivered to the dam site.

Elyria, Ohio: Following charges of NRA code violation by other bidders, the Murbach Coal Co. withdrew its bid of \$1.15 per ton for 500 tons of sand to be purchased by county commissioners. The order was equally divided between Murbach and the Kelley Island Lime and Transport Co., both of whom bid \$1.15 per ton. Other bidders, all of whom had submitted \$1.30 bids, protested, claiming that any figure lower than \$1.30 was in violation of the code. Mr. Murbach explained his withdrawal by saying he would be unable to make delivery. Although several months ago, the commissioners announced they would co-operate with President Roosevelt by making purchases only from those who observe the NRA codes, they ignored the protests of the other dealers. Harry Shaw, one of the commissioners, commented that "we do not keep a Bible of the NRA codes on our desk."

Norwalk, Ohio: Bids for 2,000 tons of stone for Townline road in Norwich and Richmond townships were \$1.30 per ton f. o. b., Centerton. The bidders were the Higgins Stone Co., Bellevue, the France

Stone Co., Toledo, and the Wagner Quarries Co., Sandusky. The contract was awarded to the France Stone Co.

Madison, Wis.: The state highway commission awarded contracts for the purchase of 500,000 bbl. of cement for use during the 1934 highway construction season. The cost was approximately \$750,000. The Manitowoc Portland Cement Co. was awarded about 45% of the total contract, or 225,000 bbl., at a cost of about \$338,000. Last year it received 25% and in 1932 it received 37%. Other companies received contracts as follows: Marquette Cement Manufacturing Co., La Salle, Ill., 120,000 bbl.; Alpha Portland Cement Co., La Salle, Ill., 30,000; Universal Atlas Cement Co., Duluth, Minn., 30,000; Petoskey Portland Cement Co., Petoskey, Mich., 25,000; Dewey Portland Cement Co., Davenport, Iowa, 20,000; Limestone Products Co., Green Bay, Wis., sales agents, 20,000; Pennsylvania Dixie Portland Cement Co., Des Moines, Iowa, 15,000; the Lehigh Portland Cement Co., Mason City, Iowa, 15,000.

Mt. Pleasant, Iowa: A contract has been arranged between the city of Mt. Pleasant and J. L. Whitney and the Ryan Co. which has a crusher located at the quarry southwest of Mt. Pleasant for at least 1,000 tons of crushed stone for use in finishing the sewer line known as "Snipe's Run" in South Mt. Pleasant. The stone was contracted for at the rate of \$1.10 a ton delivered on to the city trucks.

Fort Wayne, Ind.: Allen County Board of Commissioners let contracts for 8,000 cu. yd. of gravel for use on county highways during this year. The contract prices ranged from 32¢ to 50¢, depending upon the length of haul and other factors. The successful bidders were Dr. Benjamin Shook, Spencerville, with a bid of 32¢ on a contract for 5,000 yd.; Charles Stuck, with a bid of 50¢ a yd. for 2,000 yd, and Albion Schnelker, New Haven, with a bid of 48¢ for 1,000 yd.

Urbana, Ohio: County Commissioners have approved the purchase of 300 tons of crushed stone at a cost of \$1.20 a ton from Leo Dodd, New Vienna.

Crushed Stone

Elmhurst Chicago Stone Co., Elmhurst, Ill., has won its case to operate over the protests of adjoining property owners. The circuit court held the company's ownership of the land and intention to use it for quarrying purposes governed over a zoning ordinance later adopted by the local city council. The city council afterward refused

a petition from adjoining property owners to appeal the decision.

Willapa Harbor Quarries, South Bend, Wash., W. D. Lord, proprietor, has begun operations to furnish about 37,000 cu. yd. of crushed stone to the A. Milne Construction Co., Portland, Ore., for surfacing Ocean Beach highway between the Palix river and Ilwaco, Wash.

United States Government is in the quarry business near Hiawatha, Kan., for army engineer river work, paying labor 45¢ per hour for a 40-hour week. To cover compensation insurance 10% of the pay is deducted.

Fulton, Mo., has opened a new crushed stone quarry as a municipal relief project.

Cement Products

Henkel Concrete and Supply Co., Mason City, Iowa, is expanding its concrete products business in anticipation of a pickup in general building.

One of the steps taken in anticipation of this trend is to become the dealer for the Truscon Steel Co., the products of which include trusses, steel windows, metal lath, wire mesh, expanded corner bead, copper steel standard lintels, coal chutes, steel plates, steel and concrete highway crossings, expanded contraction plates, guard rails, reinforcing bars, steel deck roofs and steel joists.

The Henkel company also will be dealers for the Truscon laboratories at Detroit, Mich., for waterproofings, damp proofings, masonry paints, steel paints and floor hardeners.

The company also is acting as agents for the Iowa Concrete and Silo Co., Des Moines, for the cinder concrete building block for sound proofing purposes. Consideration also is being given to the manufacturing of another product, concrete joists.

The concrete construction work is also being expanded into other lines, including a culvert pipe for highways. The trend in later years has been to use concrete culverts rather than steel chiefly because it adds to employment in the community. The Henkel culverts are made in 15, 18, 24, 30 and 36 in. lengths.

The company will continue the manufacturing and servicing of concrete burial vaults which are handled exclusively through funeral directors.

In addition to the vaults the company has now begun to manufacture concrete rough boxes, which are also handled through funeral directors. Attention is called to the fact that these are not vaults, but to replace the old wooden rough boxes. They are durable, however, and prevent sunken graves.

Lime Industry Asks Many Revisions Of Its NRA Code

Code Administration Problems Overshadow Discussion of Business Opportunities

THE ANNUAL CONVENTION of the National Lime Association and a general conference of the lime industry, scheduled for Chicago, May 22-24, had to be switched at the last minute to Washington, D. C., in order to include an NRA "public hearing" on certain features of code administration. As a result, a program that would have dealt largely with new and encouraging prospects for lime consumption had to be set aside for a three-day wrangle over various code provisions. About 76% of the tonnage of the industry was represented, and the meeting was one of the best, in point of numbers, in several years.

Lime Association

The program of the meeting of the National Lime Association on May 22 consisted entirely of reports by officers and staff of the association. Three fields for lime only were discussed—mortar, agriculture, water purification.

L. A. Palmer, construction department, National Lime Association, recently with the U. S. Bureau of Standards, read a paper, "Potential Value of Completed Mortar Research," in which he summarized the report about to be published by the Bureau of Standards. He criticized the study as aimed wholly at determining relative strengths of different types of mortar materials, whereas strength of the mortar itself is not a criterion if there is lack of bond between mortar and building unit, lack of water-tightness, etc.

The results of these studies were favorable to mortars rich in lime except the tests of mortar strength and the freezing and thawing tests. Mr. Palmer contended the real purpose of a masonry cement is not to supply surplus strength but to render a wall of masonry dry or weatherproof; that if a wall is a dry one freezing and thawing resistance is superfluous.

After thus assuring the lime industry that they would not find the report 100% sales propaganda, Mr. Palmer very properly explained how to make use of it in sales work. He said in part:

"First, understand what the findings of the completed investigation really are. To do that, become familiar with terms that have hitherto not been commonly used in connection with masonry mortars. Second, know how really important are the mortar properties, designated by these terms. Third, teach others the use and meaning of these terms that serve to designate what is most essen-



S. W. Stauffer, elected chairman of board of directors, National Lime Association, and therefore head of the Code Authority of the Lime Industry

tial in masonry mortars. These three steps must be taken in order and one at a time. You cannot teach others until you yourselves are informed. You cannot win the confidence of builders if you are unable to explain to them, building phenomena, the real mechanism of water transmission through masonry walls, and the part that lime plays in this connection. By degrees and largely through your own efforts, the building world will realize that there is a great deal of information that has not been made available to them. Give them the *whole* truth. Thereby will you get them to believe in lime and in you. The day of ballyhoo and half-truths is definitely passed. To suppress any information intended for the welfare of the public is nothing short of criminal. To neglect to use such information is almost as bad."

Mr. Palmer then proceeded to discuss in some detail the properties of mortar such as water-retaining capacity, plasticity, bonding efficiency, adaptability and volume changes. The strength characteristic to be examined,

he said, was masonry strength rather than mortar strength. Mr. Palmer was emphatic in denouncing the practice of wetting brick before laying them, generally recommended as a measure of securing a bond between brick and mortar. He said a good mortar would insure a bond without wetting the brick, and that the practice of wetting brick came from using mortars of low water retaining capacity. Lime mortars are noted for their high water retaining capacity.

Bonding power was described by Mr. Palmer as "that property of mortar which gives it a tendency to adhere uniformly and completely at all points where bricks and mortars meet, under widely different conditions and with various types of units, the intensity of its adhesion being such that the tensile strength of bond is either equal to or greater than that of the mortar. In this connection, the terms bond and adhesion, mean the same thing." In this quality lime mortars are preëminent, and Mr. Palmer reasoned that there was no call for a mortar material of greater tensile strength than the strength of the bond between brick and mortar.

As to volume change of mortars, Mr. Palmer pointed out that it was volume change after hardening that was fatal to the weather proofing of masonry walls. This is a property, he said, of mortars which have a low water retaining capacity. Unsightly efflorescence is another thing blamed on mortars other than lime.

Lee S. Trainor, chief engineer, construction department, National Lime Association, reinforced Mr. Palmer's conclusions and related in detail some of the results of the promotional work already done by the association with architects and builders. Questions by members of the industry, and answers, had to do with details of construction. The lime manufacturers present showed an earnest desire to learn all they could about any shortcomings of lime, as well as its virtues.

Water Treatment

John W. Stockett, chemical department, National Lime Association, described a potential market of nearly 1,000,000 tons of lime per year for water purification and softening. A wide territory in the central part of the United States has public water supplies which could be treated profitably to reduce hardness. This subject of water treatment in which lime is a major ingredient will be treated at length in a book being prepared for distribution by the association,

the author of which, C. P. Hoover, in charge of the water purification plant of the city of Columbus, Ohio, is a recognized authority. [Mr. Hoover contributed an article for *Rock Products* on this subject in the April 30, 1927, issue.]

Agricultural Lime

Henry A. Huschke, manager, agricultural department, National Lime Association, contributed some remarks on "The New Deal and the Agricultural Lime Market," in which he seemed convinced that the AAA program of restricting crop acreage would increase the demand for lime. The farmers are using more lime for the same reason they are using more fertilizer, (1) because they want to raise as much on the land they do crop as before, (2) because the U. S. A. is supplying them with ready money which can be used to buy lime and fertilizer.

Moreover, Mr. Huschke said, the AAA is entirely in sympathy with this viewpoint as a part of its program to prevent soil erosion and deterioration. Acreage removed from crop production is being planted to grass, clover and alfalfa, not for cropping but for pasturage, soil improvement and the prevention of soil erosion. Consequently, since all these forage or pasture coverings do best with applications of lime, crop reducing programs should not prove detrimental to the demand for lime.

Accident Prevention

Paul Hatmaker, statistician of the National Lime Association, speaking on "The Dollars and Sense Value of Accident Prevention," made a plea for greater efforts toward accident prevention as a method of saving costs as well as saving of life and limb. He presented statistics which showed the lime industry, as a whole, has been negligent in this respect.

Summing Up

Norman G. Hough, president and general manager of the National Lime Association, summed up some of the thoughts presented at the meeting, emphasizing that while for the moment the code problems were overshadowing, the industry must not lose sight of the importance of association work. Only through organized promotional efforts could tonnage be developed; and tonnage is all important for profitable operation.

Mr. Hough sketched over and reemphasized some of the points brought out in the papers read by the members of his staff. He mentioned some other prospective fields for the consumption of lime, such as for the protection of underground iron and steel pipe lines from rust or corrosion. Lime for removing soil acidity around such pipes, as tested in laboratories, has been shown to be effective.

Officers Reelected

The officers and directors of the association, with a few exceptions, were reelected. As the board of directors of the association constitute its Trade Relations Committee, and as the Trade Relations Committee is the industry's Code Authority, it is thought best

at the present time not to publish this list, pending a decision by NRA as to whether or not it is satisfied with this set-up.

S. W. Stauffer, sales manager, J. E. Baker Co., York, Penn., was elected chairman of the board of directors. B. L. McNulty, president, Marblehead Lime Co., Chicago, Ill., retiring chairman, was presented with a fine Longine watch and chain by his many friends in the industry in appreciation of his splendid work in the writing and administration of the code for the industry.

Industry Conference

All of one day was devoted to redrafting the code of fair practice for the lime industry, chiefly "to clarify" some of its provisions and "to plug the various loopholes."

The principal changes proposed in the labor provisions were to provide for watchmen to work up to 60 hours per week (there was no provision for watchmen in the original code), and the inclusion of Kentucky in Southern territory classification.

The provisions covering marketing were quite considerably revised to include a recommended schedule of items for uniform cost accounting; specific instructions as to the quotation of prices at basing points to eliminate a practice that has grown up of various manufacturers attempting to file prices on *all* the basing points they choose. Under the proposed revised method a manufacturer would quote on his own basing point only, with the option of meeting the competitive price in all territories, but not of establishing arbitrary prices outside his marketing area at other manufacturers' basing points, as has been done. The price at any destination can then be arrived at by adding the minimum basing point price in this market area to the freight rate to this destination. All manufacturers would be allowed to meet this price without posting.

The revised procedure is designed to simplify the filing of price quotations and to prevent the alleged unfair practice of a manufacturer establishing a lower base price for business in a competitor's territory than he makes to customers in his own territory.

Code Administration

Various changes were adopted governing the selection, powers and duties of the Code Authority, the chief one being provision for representatives of subscribing members of the lime industry who are not members of the National Lime Association. The selection of these (all) members of the Code Authority would be left, as it is now, in the hands of the National Lime Association.

A group of the lime industry, composed chiefly of some of the Ohio finishing hydrate manufacturers, but including a few outside of these, consistently opposed all the proposed revisions; contending that the code was satisfactory as it stands, and that to open it up would give NRA an opportunity to make some revisions of its own, which might render the code innocuous. They would have the ambiguities removed and code tightened by administrative decisions or

orders rather than by code revisions. However, it was this same group which was largely responsible for reopening the code for revision through a complaint to the NRA that the Code Authority was not "truly representative" of the lime industry.

In the voting on these proposed revisions the decision was about the same in each instance, with 92 manufacturers voting in person or by proxy there were 73 for and 19 against the proposed revisions. On a tonnage basis there were approximately 1,000,000 tons for and 450,000 tons against. On some of the separate amendments those against numbered considerably less than 19. The principal objectors to the present method of choosing the code authority were two large corporations whose principal products are competitive with lime, which apparently feared that in some way, shape or manner their assessments under the code might be used by the National Lime Association. They had not the temerity to make such a charge; indeed they reiterated over and over again that they had no fault to find with the personnel of the Code Authority, its acts or its decisions. They insisted they were for "the principle" involved.

NRA Hearing

These differences were not ironed out at the conference of the industry nor in various committee meetings. Consequently they were laid before officials of the NRA who presided at the public hearing following the industry conference. The NRA hinted that objections would be made to numerous proposed revisions of the code, and there is a possibility, apparently, that when the code comes back from the NRA mill it will be stripped of some of its present strength. This code was one of the first to be approved by the President and the viewpoint of NRA on a number of features has changed radically since it was approved last summer.

The proposed budget of the Code Authority calls for a maximum expenditure of \$85,600, requiring an assessment of something like 0.7 of 1% on the sale's volume of all lime marketed by commercial producers in 1933. A separate budget was submitted by the dolomitic refractories division, and is not included in the estimate given. This budget was gone over carefully, but no exception was taken to it at the hearing, except by the group already referred to.

The NRA officials, of course, did not commit themselves on any point. Every attempt was made to bring about a compromise between the two groups, and further attempts will be made. It was obvious that NRA, as represented at the hearing, was not anxious to make the decision as to whether the selection of the Code Authority should be taken out of the hands of the association or not. If it is compelled to make a decision, this decision will be of vital interest to all trade associations which are earnestly and honestly attempting to do much more for their industries than the mere administration of their codes.

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

Concrete Units Used in Subsistence Homestead Projects

Economy and Service of Low-Cost Concrete Homes Already Put to Test and Found Worthwhile for Wide Application

IN APRIL and May, President Roosevelt gave indications that the subsistence homestead projects, now being promoted by the government, are of vital importance to his whole recovery program. Because of his continued reference to such housing plans as his "pet" planned economy, trade observers believe that spring, summer and fall of this year will be featured by a volume of low-cost home construction far above preliminary estimates.

Even now, the plans are far from indefinite, as the accompanying list of approved projects indicates. In April, Frank Walker, chairman of the President's National Emergency Council announced home building and financing as the next major step in the Roosevelt advance. The new federal plan involves the putting up of hundreds of millions of federal money to finance housing projects all over the United States. New homes are to be built; old homes are to be repaired, remodeled, spruced up. Mortgages are to be given on generous terms, with interest low and payment permitted over 10 and 20 years.

Single Control Planned

All of the activities of the government related to housing—such as the subsistence homestead plan, the Home Owners' Loan corporation, the home loan bank board, the farm credit administration, the department of agriculture's program of new housing for farmers—are soon to be coordinated under a single authority.

There is both an emergency and a permanent program in the scheme, and the temporary program as contemplated will be a rousing campaign with citizens, real estate men, building contractors, union leaders and men, building contractors and others interested cooperating.

Slogans Are Ready

Slogans such as "Rebuild America" already are being advanced. General Hugh S. Johnson has been asked to lead the vast housing program.

Previous to Chairman Walker's announcement, the government-sponsored and financed

Subsistence Homestead Projects So Far Approved by U. S.

LOCATION	HOME UNITS
Dayton, Ohio	200
Wilmington, Delaware	70
Birmingham, Alabama	300
Decatur, Indiana	48
Jones and Putnam Counties, Georgia...	500
Westmoreland County, Pennsylvania ...	100
Youngstown, Ohio	160
Reedsville, West Virginia	125
Crossville, Tennessee	200
Pender County, North Carolina	300
Houston, Texas	100
Arlington, Texas	100
Northern Wisconsin	410
Wichita Falls, Texas	50
Three Rivers, Texas	50
Beaumont, Texas	50
McComb, Mississippi	25
Laurel, Mississippi	25
Tupelo, Mississippi	25
Meridian, Mississippi	25
Hattiesburg, Mississippi	25
Hightstown, Monmouth County, N. J. ...	200
Rochester, New York	33
Jasper, Alabama	100
Austin, Minnesota	50
Longview, Washington	60
Los Angeles County, California	140
Duluth, Minnesota	52

housing program which had already given approval for some 4,000 low-cost houses was put under way with but little public attention. Important in its own right from a construction standpoint, this movement may also point a new way toward solving unemployment and adequate housing problems in the low-income groups.

The Subsistence Homesteads movement now is operating as a division of the U. S. Department of Interior, with a \$25,000,000 allotment, for a starter, from the Public Works Administration.

At Dayton, Ohio, through the aggressive effort of the Nichols Concrete Block Co., three subsistence homestead homes, built of concrete masonry, have been completed; several more are under construction. The Dayton project, originally privately spon-

sored, last fall secured a \$50,000 loan for 35 homesteads from the Subsistence Homesteads Division. In March of this year, additional allotments were made for three more units, bringing the total houses to 200.

Concrete Masonry Wins

In a search for low-cost materials, a government representative last fall spent two weeks at Dayton experimenting with rammed earth for walls. Experiments showed that because of labor involved in earth construction, concrete masonry was a lower cost material.

Each homestead consists of a house, 2 to 5 acres of land, and a small shed for chickens, supplies, etc. Loans, at the Dayton project, are limited to land and materials. Homesteaders are expected to provide the labor for building their homes—either doing it themselves or exchanging labor with those who do the actual construction. Maximum loans range from \$933.60 for a family of two or three persons to \$1,179 for a family of 7 or 8. The labor expended will give the homesteader an initial equity of about \$1,000. The balance is to be paid off in a maximum of 15 years, at approximately \$5.00 per month for the first two years (during which equipment and livestock loans are paid); \$3.00 per month thereafter.

TVA Schedules 30 Concrete Masonry Home Units

The Tennessee Valley Authority is not centering all its "concrete" attention on projects such as Norris Dam. Of equal interest to construction interests is the program for building the town of Norris Village.

One hundred houses are slated for immediate construction. Of these, 30 will be of concrete masonry, with precast joists and precast floor slabs. In addition, precast specialties such as shower stalls and floors, window sills and chimney block, will use 600 barrels of cement in the 100 houses.

Plans are being drawn for a second series of 200 houses, of which 100 will be of concrete, requiring some 7,000 barrels of cement.

Gypsum Industry's Code Made Effective May 21

THE GYPSUM INDUSTRY is now functioning under a code of fair competition approved by Administrator Hugh S. Johnson on May 7. The Code Authority has established offices in Chicago in the same building where the offices of the Gypsum Association (211 West Wacker Drive) is housed, with H. P. Stewart as secretary. Mr. Stewart has been connected with the building material business for a number of years, although not specifically with gypsum products.

Gen. Johnson's order of approval stayed the application of the code's 15-day notice period in the publication of price changes, for a 60-day period, during which the whole subject of open prices will be reviewed by NRA. Otherwise, the code contains some important changes from the one submitted to NRA (ROCK PRODUCTS, February, 1934).

In the code submitted, watchmen, engineers, firemen and pumpmen were to be allowed to work a maximum of 56 hours a week. In the code as approved only watchmen are permitted a 56-hour week. The engineers, etc., are limited to 48 hours.

The Code Authority is made up of 13 members, 12 from the Gypsum Association, one from non-membership. The Code Authority or any committee thereof must have a representative of each member of the industry producing 25% or more of its annual tonnage (this apparently to insure membership on all committees by the United States Gypsum Co.). No member of the industry, however, may have more than one representative on the Code Authority, or any committee thereof.

The interests of the industry's dominant producers are amply protected by a code provision which allows a member with 25% or more of the tonnage of the industry to hold up any action of the Code Authority for 10 days, to call for a tonnage vote (requiring 30 days more), and finally if 70% of the tonnage overrules, the action of the Code Authority is nullified. Apparently this gives the single largest producer veto power over any Code Authority act, as it is understood that this company controls practically 75% of the present tonnage of the industry.

Sales Below Cost

"Pricing or selling" below a producer's cost, as determined by a standard cost accounting method, is prohibited except that he may sell below this cost "to meet a competitive price on the same product, or except in the introduction of a new industry product, or except when the necessity of meeting the competition of a non-industry product is recognized by the Code Authority and approved

by the Administrator." This gives rather broad powers to cut prices—especially, for example, to meet the competition of lime for the plaster business.

Ready-Mixed Concrete Industry Organizes Under Code

A MEETING of the Temporary Code Authority of the Ready-Mixed Concrete Industry was held in Washington, D. C., May 18.

The meeting was well attended and a very profitable discussion of various subjects was had. The only items of particular general interest were a report relative to the cooperation of the members of the industry with the Code Authority, since the signing of the code on February 27, and the approving of a number of marketing areas.

The report indicated that a majority of the known members of the industry had filed their certifications of compliance with the Code Authority and were complying with the provisions of the code. Production affidavits filed with the Code Authority represent a reported volume of about 75% of the estimated production for the entire industry.

A number of marketing areas have been and are being established at various points throughout the country. As it necessarily takes time to establish these areas, it is the opinion of this Code Authority that good progress has been made and that the activities generally indicate a desire on the part of the industry as a whole to cooperate.

Of the marketing areas being established as local branches of the Code Authority, for the purpose of administering the code and effectuating local self-government, seven were approved at this meeting. These areas are known as the St. Louis, Los Angeles, San Francisco, Milwaukee, Pittsburgh, Boston and Cleveland "marketing areas." A number of others will undoubtedly be approved in the very near future.

Proposed Budget of Concrete Masonry Code Authority

THE proposed budget of the concrete masonry industry has been filed with NRA for approval.

The budget as proposed for the year 1934 totals \$63,100, divided as follows: Administrative expenses, \$13,700; office expenses, \$8,000; Code Authority members' meeting expenses, \$6,000; cost accounting system, \$6,000; planning and statistics, \$12,000, and expenses of regional representatives of Code Authority, \$17,400. It is proposed that the necessary money be raised by contributions

by members of the industry on a basis of 1.75% of the total current sales for 1934, the minimum assessment to be \$10.

Hazardous Occupations in Aggregates Industries

NATIONAL RECOVERY ADMINISTRATOR Hugh S. Johnson has approved a list of hazardous occupations in the crushed stone, sand and gravel, and slag industries, as submitted by the Code Authority, at which no employee under 18 years of age is hereafter to be employed. The twelve such occupations follow:

Work in or about quarries or sand or gravel banks or pits, including all surface work.

In the transportation or use of explosives or explosive substances.

All dredging work.

All work on screens or crushers.

All stevedoring work.

In oiling, cleaning or wiping machinery in motion.

In applying belts to a pulley in motion or assisting therein.

In proximity to any unguarded belt or gearing.

Work of employees engaged as firemen.

Switching and work on and about railroad equipment.

Clean-up on barges or cars under clam-shell buckets.

Driving trucks of over 2 tons capacity.

Cement

San Francisco, Calif.—The "pink cement" suit has been decided in favor of the Golden Gate bridge district, in an opinion handed down by Superior Judge Maurice T. Dooling, Jr., of San Benito County. Unless Judge Dooling's decision is overruled on appeal, it means: (1) That the board of directors of the Bridge District are upheld in their action specifying the exclusive use of high silica or "pink" cement, made exclusively in this territory by the Santa Cruz Portland Cement Co., on the south pier and fender. (2) That the legal strategy of the board in rescinding all the previous "pink" cement resolutions, following the resignation of George T. Cameron as director, and in then reacting them after Mr. Cameron had resigned, was successful. Mr. Cameron is president of the Santa Cruz Portland Cement Co., and the original resolutions specifying the exclusive use of his cement were adopted while he was a member of the board. Judge Dooling strongly indicated the original contract was illegal, according to the *San Francisco Examiner*.

On the other hand, the *San Francisco Chronicle*, which is owned by Mr. Cameron, gave the exact wording of the decision, the judge's conclusions being: "Public policy would seem to be best served by allowing

the directors to exercise their honest judgment for the good of the district, rather than to compel them to use another material against their better judgment, after the only director with a personal interest at stake has resigned. I am not unmindful of allegations the majority of the directors planned this course to nullify this pending suit and to enable Mr. Cameron and Santa Cruz Portland Cement Co. to reap the benefits of their arrangement with Pacific Bridge Co. But in

the absence of express allegations negating the good faith of the directors, I must presume they planned to nullify the suit because they honestly believed it was for the best interest of the district to use high silica cement in construction of the San Francisco pier and fender. If the directors did not act on the honest belief that high silica cement was the best available material it was open to plaintiff to plead that in the statement."

Cement Manufacturers Join in Transcontinental Trip to May Meeting

THE PORTLAND CEMENT ASSOCIATION held its spring meeting at Los Angeles, Calif., on May 8. The meeting proper was unique in that it was arranged merely as an event on a program which included trips to Boulder Dam and other outstanding projects in which conspicuous use has been or is being made of portland cement.

Eastern members left Chicago aboard a special train on May 4 to which additional cars were added at Cheyenne and other points carrying members from points farther west. At Salt Lake City, where an over-Sunday stop was made, several members from the Pacific northwest joined the party, which spent the greater part of the day sightseeing as the guests of Messrs. C. Boettcher, Eugene Enloe and Ashby Snow, presidents of cement companies operating in that vicinity. Mr. Snow, who is president of the Portland Cement Company of Utah, acted as chairman of the local committee.

The party, numbering approximately 100, inspected Boulder Dam on May 7, through courtesies extended by Walker Young, engineer in charge of the work for the U. S. Reclamation Service, F. T. Crowe, general superintendent in charge for the Six Companies, and Mayor Cragin of Las Vegas, Nev. At a temperature well above the 100 deg. mark, the enormous project was thoroughly inspected in comparative comfort and nothing but highest praise was heard for the efficient manner in which the undertaking is being handled.

As a sequel to the Dam trip, Gordon B. Kauffman, Los Angeles Architect, who is handling architectural features of the Dam and its power house, presented an excellent paper covering this subject at the meeting in Los Angeles. Other speakers were John T. Vawter, also an architect of Los Angeles, who has designed a large number of southern California buildings of monolithic construction with concrete exterior, and Norman MacBeth, vice-president of the Riverside Cement Co., who spoke on concrete houses to meet California needs.

A most interesting feature of the trip was the inspection of some 25 fine concrete structures recently erected in Los Angeles featuring reinforced-concrete construction and concrete surface finishes produced by the means of advanced form methods. The structures inspected included most of the outstanding buildings erected in the Los Angeles area recently. Careful examinations were made of the Los Angeles General Hospital, the largest building on the Pacific Coast, and of a dozen other buildings including churches, schools, theatres, banks, and office buildings. Everywhere the new type met with immediate favor and acceptance.

Another trip provided opportunity to traverse and inspect the new Ride Route Alternate, a 30-mile length of concrete highway running north from Los Angeles 40 ft. in width, with solid rock cuts as deep at 200 ft., built for speeds up to 60 miles per hour. It is considered the most remarkable stretch of mountain highway in America. Still another trip was made on San Francisco Bay, as the guest of Charles E. Andrew, bridge engineer of the Department of Public Works, State of California, to inspect the new San Francisco Bay bridge, the largest bridge project ever undertaken. Amazing for its variety of engineering technique as well as concreting practice, this structure with a total length of 8¼ miles and using 1,300,000 bbl. of portland cement, proved an inspiring treat for the manufacturers.

The Los Angeles committee for the meeting included Frank H. Powell, president of the Southwestern Portland Cement Co., chairman, and Ernest E. Duque, president of the California Portland Cement Co., John Treanor, president of the Riverside Cement Co., and Coy Burnett, president of the Monolithic Portland Cement Co. The San Francisco committee, headed by W. W. Mein, president of the Calaveras Cement Co., also included Robert B. Henderson, president of the Pacific Coast Portland Cement Co., George T. Cameron, president of the Santa Cruz Portland Cement Co., and A. Emory Wishon, president of the Yosemite Portland Cement Co.

At the luncheon preceding the business session of the meeting on May 8, the Portland Cement Association received the award of the Joseph A. Holmes certificate for excellence in safety achievement. Chairman of the Board George F. Coffin accepted on behalf of the Association. J. B. John, chairman of the Committee on Accident Prevention and Insurance, formally awarded the Portland Cement Association Safety Trophy for 1933 to 13 mills which had not previously received it, and re-awarded the trophy to 38 additional mills which had continuous accident free records of from two to six years.

Entertainment features in connection with the meeting left all of the visitors deeply indebted to their California hosts who, as usual, were fully equal to the occasion.

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Crushed Stone

C. S. Pomeroy, Fremont, Ia., a small operator, is developing a business other limestone quarry operators might find profitable in their localities. Mr. Pomeroy began turning out commercial limestone for farms several years ago but soon found a demand for special types of rock for home landscape purposes. Rock supplied to a number of Oskaloosa homes for flagstone walks and terraces, for rock gardens, and for beautifying pools, created a market for this type of stone that has promised to out-distance the demand for agricultural limestone. His quarry has been attractively landscaped for picnics and Mr. Pomeroy remains at the quarry Sundays and holidays to welcome visitors.

♦ ♦ ♦

Syracuse, N. Y., has opened up a long disused quarry on East Brighton ave. as a state temporary emergency relief administration project. It will be used to supply crushed stone for municipal construction.

♦ ♦ ♦

Eastern Rock Products, Inc., Oriskany Falls, N. Y., suffered a blasting accident on April 30 which cost the life of one workman and serious injuries to three others, including Earl Elmer, plant superintendent. According to newspaper accounts an explosion occurred while a charge of dynamite was being tamped into a well-drill hole. The concussion set off charges in other holes. This company has been outstanding in safety work. All employees are said to have been experienced.

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Durham, N. C., has contracted to sell crushed stone from a municipal quarry to a paving concern for city work. Efforts of local producers to prevent this form of unfair competition have been unsuccessful.

♦ ♦ ♦

Union Stone Quarry, operated by Union township, Van Wert, Ohio, is reported to be making extensive improvements to its crushing plant.

New Machinery and Equipment

Respirator Series

THE PULMOSAN Safety Equipment Corp., cooperating with dust control engineers, has developed a new and improved line of respirators for protection of workers against inhalation of lead, silica and similar dusts.

Protection against spray mists also is effected by the new respirator which is featured by an increased filter size, a direct breathing intake and unusually coarse wire screens to permit easier breathing. (Screens are bound with aluminum for greater strength and safety.) The gas mask type exhaust valve is used; a further refinement is a change from elastic headbands to all-rubber adjustable headbands for long and comfortable wear.

The headbands are attached to a swivel joint that allows free movement of the head without respirator leaving the face. Goggles can be worn without interference.

Heavy Rock Hauls

FORTY TONS of rock and gravel to the load. A round trip every six minutes on a quarter mile haul: That is said to be the record made by the "Caterpillar" Diesel 75's equipped with 30-yd. LeTourneau carts in connection with the San Francisco-Oakland Bay bridge project.

The carts are equipped with Goodyear air wheels and are built entirely of arc welded "high tensile strength" steel. Unloading is accomplished by sliding rather than lifting the loads off the carrying bed. The power take-off which operates the sliding bed as

well as all other parts of the buggy, is likewise of welded steel. The cart unit is 23 ft.; body width, 10 ft.

Merger

TWO LONG established equipment manufacturing companies, Western Wheeled Scraper Co., Aurora, Ill., and Austin Manufacturing Co., Harvey, Ill., have consolidated and announced the new corporate name as Western-Austin Manufacturing Co. Western Wheeled Scraper Co. began its manufacture of wheeled scrapers more than 50 years ago.

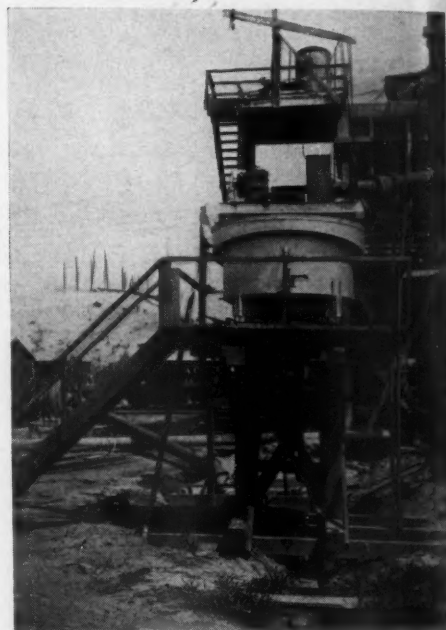
Portable Steel Compressors

AS EVIDENCE of Diesel power economy, the Gardner-Denver Co., in introducing its new Diesel portable compressors, claims that savings of up to \$5.38 a day over ordinary types of power may be made with these new units.

Tests conducted gave the following data: On basis of 100 lb. of air pressure capacity, at sea level, with gasoline at 15c a gallon, the fuel cost per hour on a gasoline unit was 95.5c; under the same conditions when using Diesel fuel at 6.2c per gallon, the fuel cost per hour for the Diesel portable was 27.2c, according to the Gardner-Denver Co.

Classifier Demonstrated

ASIX FOOT hydraulic classifier unit recently was mounted on a trailer for the Hydrotator Co., and routed through the



Above: A Hydrotator installation. Below: Hydraulic classifier unit mounted for demonstration



Tractor drawn cart designed to carry 40-ton loads of rock for fill-in approaches to San Francisco-Oakland Bay Bridge. Each of the eight pneumatic cart tires is 20 in. wide

southeast. Observation of the unit has led to current trials on the part of various phosphate companies for classification of fine phosphate rock. "This classifier," explains the company, "takes the washer water and fine solids, overflows the water, clay and fine solids through 60, 100 or 150 mesh as desired; it underflows a clean, deslimed sand product ready for flotation treatment." Illustrations above show details of the design in the demonstration model and actual installation.

Truck Mounted Welders

THE SHUNT INDUCTOR type welder brought out by Universal Power Corp., Cleveland, Ohio, is truck mounted. The company particularly recommends this equipment in combination with air compressor unit for chipping, cleaning and cold-working. The truck can be driven only after the power take-off is disengaged.

Truck Tires

SAID TO BE "triple protected," new truck tires being produced by the B. F. Goodrich Co., Akron, Ohio, have a special composition to bear the brunt of strains caused by fire flexing in truck operations. Tire engineers of the company claim that the new composition and its special construction distribute stresses throughout the tire carcass and largely eliminate local weakness.

One-Man Truck

WHEN A MOTOR breaks down or needs repairs, special type of portable truck now is provided which can be wheeled immediately into position, ready to run under its own power on short notice. Such a unit was developed by the Rockwood Manufacturing Co., Indianapolis, Ind., primarily for the farm field. Its industrial application, however, is widening.

The truck consists of a standard Rockwood drive made as a part of a practical, sturdy truck. Units of this sort have a usage in all industrial plants using a large number of motors. "The drive truck" will accommodate, says, the manufacturer, practically any of the standard makes of electric motors or gas engines up to 400 to 500 lb.

Portable Platform Scale

EXTREME loads may be placed on the outer edges of the new platform scale offered by the Kron Co., without affecting the accuracy of the scale reading, according to the manufacturer. The platform measures 21 by 29 in. with three wheel or four wheel construction optional. Ball bearing, one-cam translation mechanism is part of the regular equipment. Leverage has no lateral movement, it is claimed.

Equip Compressors with Air Filters

WHEN the Wenzel and Hensch Construction Co., of Milwaukee, Wis., began operation on the new water tunnel they are building to connect the Swift and Ware rivers as a part of the water supply system for greater Boston, they were faced with the problem of keeping air compressors used on the project in continuous 24-hr. day operation.

The tunnel will be 54,000 ft. long. To speed operations, four vertical shafts were

sunk and operations started from these points.

For each of these shafts there is a battery of three Sullivan double-acting, single-cylinder air compressors, each with a rated capacity of 800 c.f.m. Considerable apprehension was felt as to the abrasive effect the dust and grit filling the air around the compressor intakes would have on the cylinder walls and pistons of the air compressors.

Each compressor's air intake was therefore equipped with a Coppus-Annis dry felt filter, manufactured by the Coppus Engineering Corp., of Worcester, Mass., and a Type FC-8 unit with a capacity of 880 cu. ft. was installed in a weatherproof housing on each compressor intake pipe.

It is claimed that in excess of 150,000,000 cu. ft. of air has been drawn through filter and that no attention has been required.

Diesel Locomotives

ASIX-TON Brookville locomotive has been brought out by the Caterpillar Tractor Co. It is powered with a "Caterpillar" Diesel engine which designers claim



Diesel Locomotive

will effect very substantial savings in fuel costs to users of small industrial locomotives.

The 3-cylinder engine unit, developed primarily for heavy duty tractor service, is said to be well adapted for its new application because of its flexible operation and its ability to burn variable fuels in the low price range. The locomotive chassis is practically the same as that used for the Brookville gasoline-powered locomotives. Its features include double structural steel frame with engine and transmission mounted separately on a sub-frame. The transmission is 4-speed with an all-speed reverse which makes the four forward speeds also available in backing operations.

Detachable Bits Marketed as "Jackbits"

JACKBITS are announced by Ingersoll-Rand Co., New York, N. Y. They are detachable rock drill bits which replace the conventional bits forged on the ends of drill steels. They are secured directly to the end of the drill rod by means of a shallow, reverse buttress-type thread of a carefully de-

termined angle. The maximum hammer blow is transmitted through the end of the rod, close to the cutting edge, and there is no pressure on the threads.

Other features claimed are large clearance grooves to pass cuttings from the bottom of the hole, a counter-sunk hole in the center of the cutting edge which acts as a pilot to guide the bit, and cadmium plating to prevent rusting and to give a bright finish which minimizes the loss of bits.

Reports Efficiency of Concrete Proportioning Scale

THE feasibility and efficiency of proportioning concrete by weight has been demonstrated by the record of the Toledo Aggregate Determination Auto-Gage used in the construction of the Koon Dam in Pennsylvania, the Toledo Scale Co., Toledo, Ohio, states. When the job, involving approximately 81,000 bbl. of cement, was completed the difference between records of materials received and cement used was only four-tenths of 1%, including the usual waste in transportation. The electric recording device on the scale gave a complete record of each batch.

Alloy Steels

IN developing ways and means for reducing costs in the quarry and rock products industry in general, many companies report an increasing use of special alloy materials. One company in the eastern area recently revealed that through the use of "Ryco" and "Nikrome" alloy steels, it was able to save considerable money. They have been utilizing these two steels for tractor and shovel pins, studs and bolts under heavy duty, etc.

The master mechanic at the quarry has stated that under equivalent production the concern had been able to reduce maintenance costs from \$20,000 to \$11,000 per month and that he had attributed most of this success to the use of these alloys on parts that formerly required constant replacement.

Ryco heat treated alloy steel is reported tough, strong and economical and is used where greater strength and endurance is required than is provided by either mild steel or cold rolled shafting but where strain is not severe enough to require a higher grade alloy.

Nikrome heat treated alloy steel (also furnished by Joseph T. Ryerson & Son, Inc.) is said to be the highest quality special chrome nickel steel and is used where the greatest strength and stresses are encountered.

Miniature Furnace

A ROCKING TYPE electric furnace, designed as a reproduction of the larger rocking electric furnaces but restricted to 25 to 100 lb. capacity, has been announced by the Detroit Electric Furnace Co. The furnace is completely equipped with transformers, control panels, switches, etc.



THE INDUSTRY

New Incorporations

National Rock Asphalt Corp., Oklahoma City, Okla., capital \$1,000.

De Lany and De Lany, Inc., Bloomfield, N. J. Sand and gravel. 500 shares no par.

Great Notch Granule Co., Newark, N. J., sand and gravel. 1,000 shares no par value.

Crawford Bauxite Co., Little Rock, Ark. Incorporators: Dr. J. B. Crawford and Glenn Dill.

Specialty Sand Co., 314 East Ohio Gas Bldg., Cleveland, Ohio, with H. J. Piehl in charge.

Medina Quarries, Inc., Albion, N. Y., to operate stone quarries, filed by Edward Ryan, 210 shares no par value.

East Texas Lime Co., Dallas, Tex., capital stock \$4,000. Incorporators: W. E. Butler, Harry Cooper and B. J. Wynne.

South Texas Stone Co., Houston, Tex., capital stock \$10,000; construction. Incorporators are: R. M. Amrine, Florence E. Amrine and G. D. Dust.

Architectural Stone Co., Inc., Montague, Mass. 500 com. shares no par value. Incorporators are: Sam Failla, president; Noe Regali, treasurer, Turner Falls, and Fred P. Greenough.

Hallett Construction Co., Minnesota, Wis., for the production of sand and gravel and timber products. Authorized capital stock \$200,000 com.; paid in, \$200,000. Prop. in Wis., \$25,000.

Indiana Rock Asphalt Corp., Indianapolis, Ind., capital stock 1,000 shares common no par value. To manufacture construction materials. Incorporators are: C. V. Wolfe, R. H. Rogers and A. C. Ehrenfried.

Personals

C. D. Adams, formerly of the France Stone Co., now is superintendent of the Dolomite, Inc., quarry at Maple Grove, Ohio.

Major J. Calvin Shumberger, of Lehigh Portland Cement Co., presided at a recent session of the Controllers Institute of America in New York, N. Y.

William Henry Harrison, Washington, D. C., has been working for several months in east Tennessee for owners of rock products plants in connection with Federal tax requirements.

John O'Callaghan, former superintendent of Lone Star Cement Co. plant, Norfolk, Va., has been appointed superintendent of the company's plant in Bonner Springs, Kan. He succeeds the late Edwin Struckmann.

Ryozo Asano, vice-president of Asano Portland Cement Co., was named last month as member of the Japanese executive committee of the American-Japanese Trade Council to be established in Japan for co-operation with the council's organization in New York, N. Y.

Obituaries

Charles M. Waldron, president of Sprout, Waldron and Co., Muncy, Penn., died April 22.

Everet W. Weaver, 48, of Ottawa, Ill., president of Illinois Silica Sand Co., died recently.

John Garber, 54, concrete products manufacturer of Strasburg, Ohio, recently died at Massillon, Ohio.

E. L. Hart, Jr., 48, son of E. L. Hart, of the Pioneer Sand Co., recently died at his home in Wichita, Kan.

Joseph J. Hock, 54, president of the Arundel Corp., sand, gravel and slag producers, died recently at a hospital in Baltimore, Md.

James A. Smith, president of the Smith and Brennan Concrete Pile Co., and former building commissioner of St. Louis, Mo., died. He was 70.

John J. Callanan, 80, Albany, N. Y., for many years manager of the Callanan Road Improvement Co. at South Bethlehem, died recently at his home.

Walter D. Wood, president of R. D. Wood and Co., Philadelphia, Penn., died April 20. He was 84. A civic leader, the deceased

was a member of several technical societies including American Society of Mechanical Engineers and American Society for Testing Materials.

W. D. Mount, 67, consulting chemical engineer of Lynchburg, Va., died recently. For 20 years previous to 1918 he was successively general superintendent, general manager and director of the Saltville, Va., plant of the Mathieson Alkali Works. Since that time he had carried on an extensive consulting practice in the fields of lime, alkali and paper manufacture. He was the holder of numerous patents in these fields, among which the most notable are for continuous, gas-fired, vertical lime kilns; continuous rotary filters of the vacuum pressure types; and continuous causticization with lime recovery. He was a former contributor to Rock Products.

Sand and Gravel

Union Pacific gravel pits at Buford, Wyo., were opened in May.

Stripping of gravel pits near Madison, S. D., recently was started.

City of Princeton, Ill., has approved purchase of gravel pit property.

City Council, Dover, Ohio, has deferred action on purchase of gravel pit property.

Neal Gravel Co. has opened its pit south of Attica, Ill., on a graduating basis from two to three shifts.

Missouri River Gravel Co., La Grange, Mo., recently increased its operations in the state pit to a three-shift basis.

Harvey Mead is now sole owner of the Felton Sand and Gravel Co., Felton, Calif., operating the largest sand and gravel plant in this section. R. M. Greathouse has discontinued his connections with the business.

McGrath Sand and Gravel Co., Lincoln, Ill., reports sales and tonnage in excess of the 1933 season. Recently received was an order for 50,000 tons of sand for Mississippi River Lock Project No. 16 near Muscatine, Iowa.

Muskingum Valley Gravel Co., Zanesville, Ohio, has purchased equipment and business of the Buckeye Sand and Gravel Co., operated by Ray Webster and sons, Brooks and George in the area around McConnelsville and Malta, Ohio.

Quarries

Earl Lyons is operating a quarry north-west of Moberly, Mo.

E. O'Neil has leased C. E. Cook's rock quarry north of Doniphan, Kan.

Rockpoint Stone Co., Bluffton, Ohio, recently began stripping operations.

Rockton Quarry, near Marshalltown, Iowa, has been reopened as a relief project.

Hodges Rock Quarry, near Springfield, Ill., suffered a \$4,000 fire damage April 27.

A government rock quarry project has been established near Wathena, Kan., in Doniphan county.

Keller Quarry Co., Grafton, Ill., has moved equipment to West Point Landing in Calhoun county.

Rock crushing operations have been undertaken by the town of North Little Rock, Ark., to employ 200 men.

Hawkeye Quarries, east of La Porte, Ind., have been operating full time. Kermit Cravenhorst is superintendent.

Sturgeon Bay Quarry Co., Sturgeon Bay, Wis., is operating two eight-hour shifts. Much new equipment is being installed.

Kelley Island Lime and Transport Co., Kelley Island, Ohio, after an expenditure of over \$10,000 for plant modernization, is operating at full capacity.

Union Stone Quarry, near Van Wert, Ohio, has undergone extensive modernization this season. About \$8,000 has been spent for screens, elevating and other equipment.

Cement

Cowell Cement Co. plant, Cowell, Calif., reopened May 15.

North American Cement Co. plant, Howes Cave, N. Y., reopened May 15.

Canada Cement Co. plant, Pt. Colbourne, Ont., resumed operations in May.

South Dakota state cement plant, Rapid City, S. D., has resumed operations.

British Columbia Cement Co. plant, Victoria, B. C., has been closed temporarily.

Oregon Portland Cement Co. plant at Oswego, Ore., resumed operations in May.

Medusa Portland Cement Co. Bay Bridge plant near Sandusky, Ohio, recently started its kilns.

Northwestern States Portland Cement Co., Mason City, Iowa, resumed operations in its plant in May.

Petoskey Portland Cement Co., Petoskey, Mich., has resumed operations for a run estimated to last six months.

Cement Products

Austin Concrete Works, Inc., Austin, Texas, has added equipment for producing concrete tile.

Cement block plant of Horton Lumber Co., Horton, Kan., has been reopened after a shutdown lasting 2½ years.

Cement block plant of Fournier Freres, Lachine, Que., recently was damaged by fire. Estimated loss was \$2,000.

Decorah Concrete Products Co., Decorah, Iowa, has been organized by C. B. Taylor, A. R. Coffeen and J. B. O'Rourke.

Santa Clara Valley Concrete Pipe Co., San Jose, Calif., now is operated by a co-partnership composed of M. P. Matich, N. B. Piriach, Matto A. Jasprica, and M. Serak. A busy year is ahead, state the partners, and throughout the Santa Clara valley agriculturists of all kinds are looking forward to a season of farm improvements which will call for much concrete work of all kinds.

Miscellaneous

Santa Rosa Rock Asphalt Co., Santa Rosa, Calif., reported fire loss in May of \$30,000. Storage, crushing and mixing facilities were destroyed.

Fort Logan Materials Corp., Logansport, Ind., has sold its asphalt plant to the Indiana Rock Asphalt Corp., of Indianapolis and Columbus.

Manufacturers

Correction: The descriptive booklet "Carbex Silicon Carbide Brick" listed on Page 72 of the May issue of Rock Products was erroneously credited to O. S. Tyson and Co., Inc. The booklet was published by: General Refractories Co., Philadelphia, Penn.

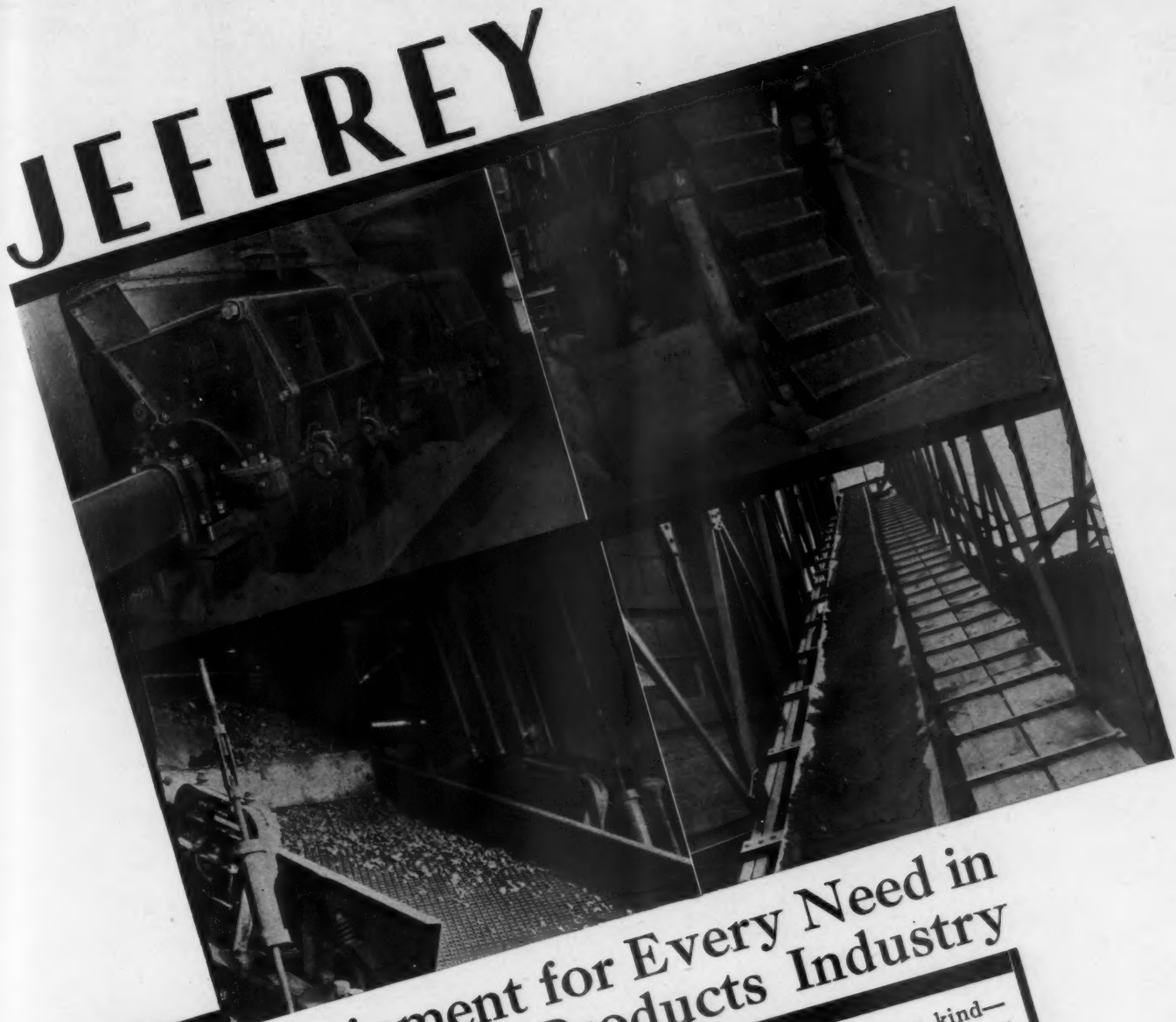
Foot Bros. Gear and Machine Co., Chicago, Ill., recently appointed F. A. Emmons, Jr., to one of the five Chicago sales districts of the company. J. H. Nicholson, Omaha, Neb., A. C. Hanson, New Buffalo, Mich., J. M. Davis, Denver, Colo., and S. D. Calloway, Kansas City, Mo., also have been appointed as sales representatives.

Consolidated Products Co., Inc., New York, N. Y., has made alterations and extensions to its suite on the twentieth floor of 15-16-17 Park Row, adding a number of new private offices and enlarging executive and clerical space. They report a more widespread demand for used machinery, and this expansion for office space has been arranged to take care of the "increased volume of business."

H. S. Colby has been appointed general sales manager of Combustion Engineering Co., New York, N. Y. Mr. Colby, until recently, was president of the Air Preheater Corp. His technical education was acquired at Cooper Union and Columbia University and for the past 20 years he has been engaged in the design, production and sales of steam generating equipment involving boilers, stokers, pulverizers, economizers and air preheaters.

Ralph P. Brown, formerly in charge of publicity for the National Lime Association and the Brown Instrument Company, and recently conducting an independent business paper editorial service in Cleveland, has joined the advertising department of The Timken Roller Bearing Co. and The Timken Steel and Tube Co., Canton, Ohio. Mr. Brown is a graduate engineer and has had a wide experience in writing for the industrial press. It will be his duty to cooperate with the business and technical press editors in the preparation of articles dealing with alloy steels and bearings.

JEFFREY



Equipment for Every Need in the Rock Products Industry



If you have a material handling or reduction job of any kind—and want it done quickly and economically—there is a right Jeffrey Unit to do that job correctly and without forcing the application of any type.

All kinds of bulk material including: stone, gravel, sand, cement, lime, gypsum, and similar products are being elevated, conveyed, screened, washed, or reduced to any size—by Jeffrey Equipment.

The Jeffrey Line includes: Elevators and Conveyors . Electric Vibrating Conveyors, Screens and Feeders . Crushers . Pulverizers . Portable Loaders . Sand and Gravel Handling Machinery . Washing and Screening Equipment . Coal and Ashes Handling Machinery . Chains and Attachments . Locomotives . Sand Settling Tanks . Sprocket Wheels . Gears.

Our Jeffrey Engineers will be glad to solve your handling and reduction problems. Write today.

The Jeffrey Manufacturing Company
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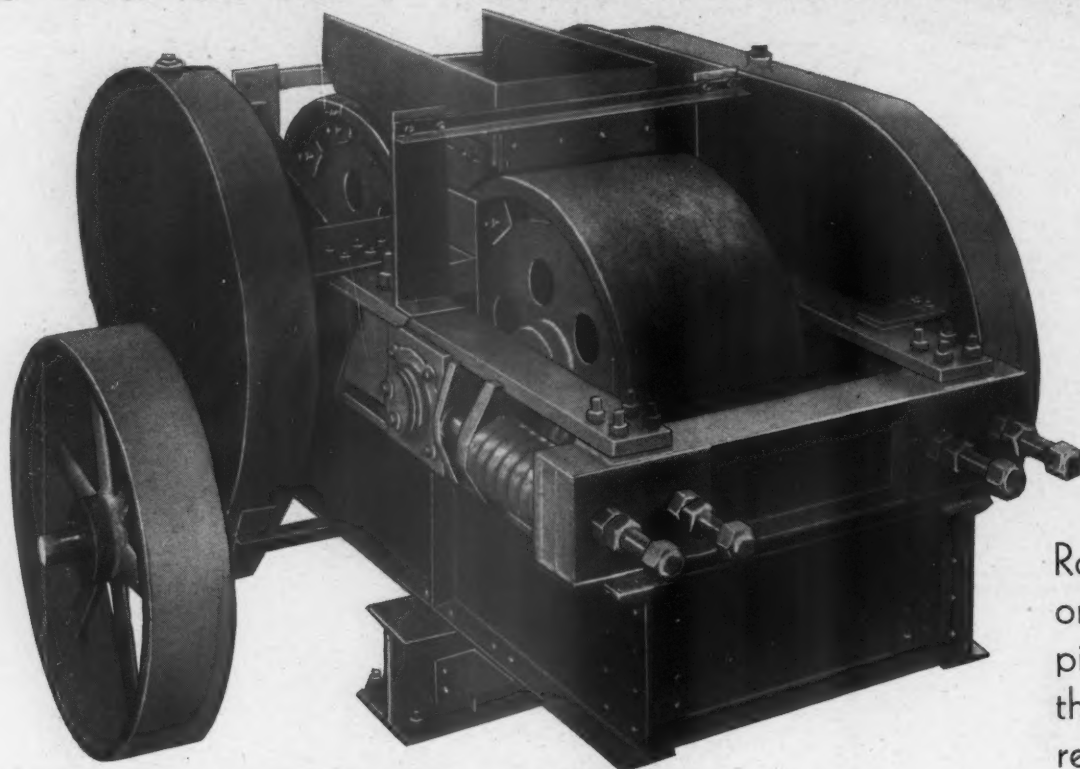
Huntington, W. Va.
Milwaukee
St. Louis
Dallas

Denver
Salt Lake City
Birmingham

Jeffrey Manufacturing Company, Ltd., of Canada
Head Office and Works, Montreal—Branch Offices, Toronto—Vancouver—Calgary

75 TONS HOURLY

3" MINUS TO 1" MINUS WITHOUT EXCESS OF FINES

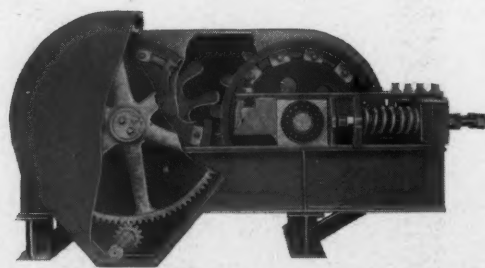


THERE ARE 7 REASONS
WHY YOU CAN EXPECT
THAT OF THE

Rolls crush with only one impact on each piece while receiving three inch rocks and reducing them down to one inch. A continuous band of material passes straight through the rolls and is reduced in one crunch from three inches down to one inch in size.

PIONEER 40 x 20 ROLLS

- 1 Positive Adjustment for Size**—Adjustable back-stop wedges compel positive sizing of material thus eliminating excessive fines.
- 2 Gear Driven in Oil**—Pioneer Roll Crushers are driven by 7 to 1 reduction steel cut gears running in a bath of oil. This eliminates expensive shut-downs for replacement and transmits ample power for operating at continuous full load.
- 3 Both Rolls Power Driven**—A positive drive to the second roll is provided by Star gears running in oil.
- 4 Shells Perfectly Round**—Manganese shells mounted with self-aligning wedges on machined cores are perfectly round.
- 5 Anti-Friction Bearings**—Shafer Bearings on the Countershaft and Timken on the Roll shafts.
- 6 Built of Quality Materials**—Cut Molybdenum steel gears—Molybdenum steel Star gears—Manganese shells—riveted and welded frame.
- 7 Light Weight, 16200 Lbs.**—Weighs 50% LESS than other types of reduction crushers of same capacity.



PIONEER ROLLS BUILT IN 4 SIZES

*May We Assist You with Your
Crushing Problems?*

**PIONEER GRAVEL
EQUIPMENT MFG. CO.**

1515 CENTRAL AVE., MINNEAPOLIS, MINN.

PIONEER CRUSHERS DO YOUR WORK FASTER—CHEAPER—BETTER



May we repeat

Use the right CORDEAU for the job

Use Plain Cordeau for hooking up the holes above ground, and Countered Cordeau for the holes themselves. The size and depth of the hole will determine the type of Cordeau needed.

Five types are available: Plain, the lead sheath being without reinforcement; Countered, with one wrap of cotton yarn; and Double Countered. For very deep holes and other unusual conditions we recommend Wire Bound Cordeau, No. 1 or No. 2.

There is no limit to the number of holes that can be connected at one time. The added force because every cartridge is detonating agent.

CORDEAU DETONATING FUSE BICKFORD
THE ENSIGN-BICKFORD COMPANY

Yes! it can be profitable to hook up jackhammer holes with Cordeau.

CORDEAU is an insensitive DETONATOR

This book explains Cordeau-Bickford Detonating Fuse and shows how it can be used profitably. Sent free to executives.

Cordeau is a lead-encased core of TNT, insensitive, and must be detonated by a fuse cap or E-B cap. When so detonated it carries an explosive wave at a speed of approximately three miles per second; practically instantaneous, yet permitting the blast to be so planned as to relieve burden through successive detonations.

The proper use of Cordeau has been found to result in more work from the explosives. The line of Cordeau, extending from the bottom to the top of each hole, detonates every cartridge in each load. Thus each cartridge is, in effect, a primer

cartridge, having *added* force — doing more work.

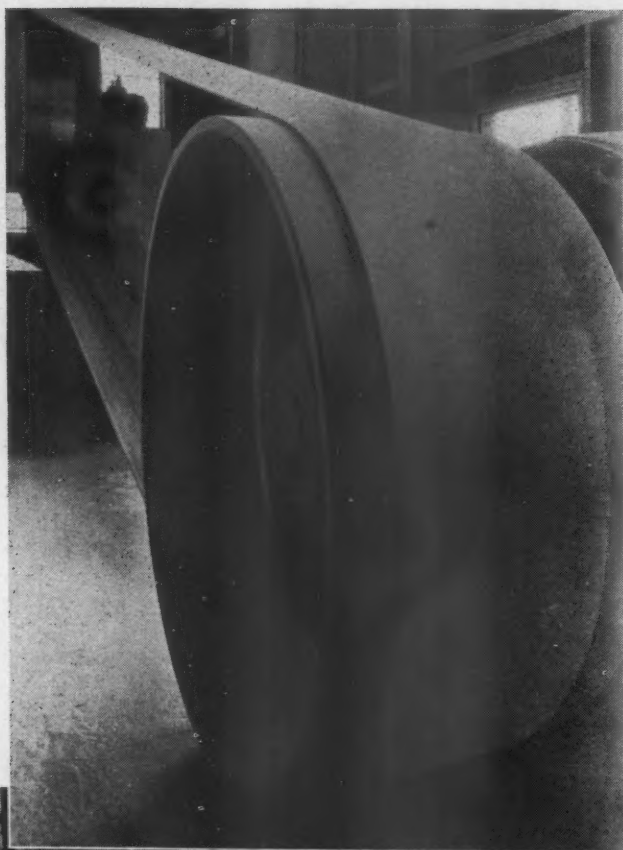
The use of Cordeau simplifies loading, permits giant hook-ups, reduces misfires — results in more efficient blasting. Perhaps you can use it to advantage in *more* of your blasting.

CORDEAU
DETONATING FUSE
BICKFORD

CB-31

THE ENSIGN-BICKFORD COMPANY, Simsbury, Connecticut

A DOCTORED BELT



NEXT TIME you buy a conveyor belt get a husky workman—not a potential hospital case. Any belt can be patched up, spliced, doctored—but it doesn't do much work while it's on the sick list. It takes a Goodrich Belt, engineered by Goodrich to the job it is to handle, to give you years of steady work, without a moment off for pampering, and except for accident without a dime for doctoring expense.

Goodrich engineers believe that most belt costs are too high. In



TOP—Endless Highflex Transmission Belt which replaced the 20' leather belt on April 14th, 1930, and is still in almost perfect condition.

BOTTOM—Because of care in manufacturing, and in engineering to the job, Goodrich Conveyor Belts run straight and true, conforming to the idlers at all times.



Goodrich

IS ALWAYS SICK..

many cases we have lowered investment cost by more scientific selection of belt for the job. In even more cases we have lowered maintenance cost by working with the buyer to fit belting material, number of plies, type of covers and condition of conveying equipment to the work to be done. Even belt experts who have been buying for years have been amazed at the savings the Goodrich method makes possible.

Goodrich Conveyor Belt is constructed with all the famous improvements which have made Goodrich Highflex Transmission Belt outstanding. It doesn't cost anything to investigate Goodrich. And once you install it you'll find that everybody saves money—and the repairman saves work. The B. F. Goodrich Rubber Company, Mechanical Rubber Goods Division, Akron, Ohio.

ALL *products problems* IN RUBBER

Conveyor Belting



Goodrich bucket elevator for the handling of wet crushed ore.

GOODRICH MECHANICAL RUBBER GOODS FOR THE ROCK PRODUCTS INDUSTRY INCLUDE:

- *Conveyor, Elevator and Transmission Belting.*
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- *Chute Lining.*
- *Dredging Sleeves.*
- *Packing . . . and*
- *A Complete Line of Miscellaneous Rubber Items.*

Classified Directory of Advertisers in this Issue of Rock Products

For alphabetical index, see page 2

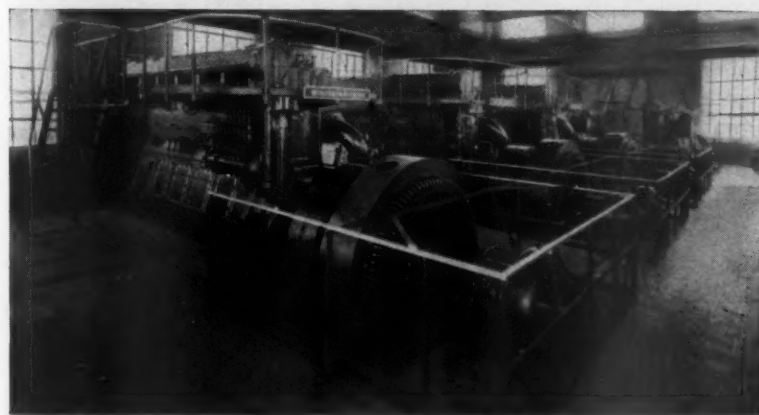
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Fuller Co.
- Air Pumps**
Ingersoll-Rand Co.
- Air Separators**
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Richardson Scale Co.
- Ball Bearings**
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Link-Belt Co.
Joseph T. Ryerson & Son, Inc.
S K F Industries, Inc.
Timken Roller Bearing Co.
- Bearings (Anti-Friction)**
S K F Industries, Inc.
Timken Roller Bearing Co.
- Bearings (Roller)**
S K F Industries, Inc.
Timken Roller Bearing Co.
- Bearings (Tapered Roller)**
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- Bearings (Thrust)**
S K F Industries, Inc.
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- Belt Lacing**
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Traylor Eng. & Mfg. Co.
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Link-Belt Co.
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Timken Roller Bearing Co.
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- Cement Pumps**
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F. L. Smidth & Co.
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Jeffrey Mfg. Co.
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Chain Belt Co.
- Chain Systems (Kilns)**
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Macwhyte Company
Williamsport Wire Rope Co.
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- Coal Crushers and Rolls**
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- Compressed Air Hoists**
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Pioneer Gravel Equipmt. Mfg. Co.
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Smith Engineering Works
Traylor Eng. & Mfg. Co.
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Link-Belt Co.
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C. O. Bartlett & Snow Co.
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Bucyrus-Erie Co.
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Koehring Company, Div. of National Equipmt. Corp. (Gasoline and Electric)
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- Dredges**
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- Drills (Blast Hole)**
Worthington Pump & Machy. Corp.
- Drills (Core)**
Ingersoll-Rand Co.
- Drills, Hammer (See Hammer Drills)**
- Drills (Rock)**
Gardner-Denver Co.
Ingersoll-Rand Co.
- Drives (Short Center)**
Allis-Chalmers Mfg. Co.
Fairbanks, Morse & Co.
Worthington Pump & Machy. Corp.
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Combustion Engineering Corp.
Traylor Eng. & Mfg. Co.
- Dumprots**
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Fuller Co.
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Fairbanks, Morse & Co.
- Engineers**
Kritzer Co.
Productive Equipment Corp.
F. L. Smidth & Co.
- Engines (Diesel)**
Fairbanks, Morse & Co.
Ingersoll-Rand Co.
Worthington Pump & Machy. Corp.

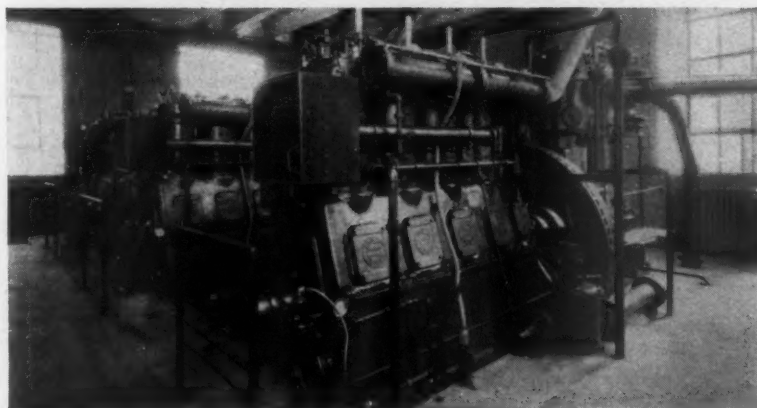
HUDSON RIVER STONE CORP. CHOOSES GULF QUALITY DIESEL LUBRICANTS



A splendid aerial view of the Hudson River Stone Corporation's plant.



Above—The three 660 H.P., 6 cylinder Diesels in the foreground and the three 160 H.P., Diesel compressors in the background. Below—The three Diesel compressors.



for the six large
units in their effi-
cient Diesel plant

TO ASSURE low maintenance costs, freedom from oxidation troubles and low oil consumption, the Hudson River Stone Corporation at Cold Springs, N.Y., relies on Gulf lubricants for their six large Diesel units.

This outstanding plant is one of a long list of Diesel operators who are cutting operating costs through the use of Gulf's unparalleled line of Diesel lubricants.

If you, like most Diesel operators, are looking for new means and devices to effect savings, we suggest that you go into the matter of improved lubrication *thoroughly* with a Gulf engineer. He can help you.

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District Sales Offices

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Houston Pittsburgh Louisville Toledo

*This booklet will help you re-
duce Diesel operating costs.
Send for it.*



GULF REFINING COMPANY

R.P. 6

3800 Gulf Building
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Please send me, without charge, "Gulf's 7 Point Plan for Industrial Lubrication."

Name.....

Company.....

Address.....

Classified Directory of Advertisers in this Issue of ROCK PRODUCTS

For alphabetical index, see page 2

Engines (Gas, Kerosene, Oil)
Fairbanks, Morse & Co.

Engines (Steam)
Morris Machine Works

Excavating Machinery (See Shovels, Cranes, Buckets, etc.)

Excavators (Crawling Tractor)
Koehring Company, Div. of National Equip't. Corp.

Excavators (Dragline)
Koehring Company, Div. of National Equip't. Corp.

Fans (Exhaust)
Jeffrey Mfg. Co.

Feeders
Chain Belt Co.
Fuller Co. (Cement and Pulverized Material)
Jeffrey Mfg. Co. (Pan and Tube)
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Furnaces
Combustion Engineering Corp.

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United States Rubber Co.

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Link-Belt Co.

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Fairbanks, Morse & Co.

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Hayward Co.

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Jeffrey Mfg. Co. (Vibrating)
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Traylor Eng. & Mfg. Co.

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Ingersoll-Rand Co.
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Kritzer Co.

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Ensign-Bickford Co.

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Kritzer Co.
Link-Belt Co.
Raymond Bros. Impact Pulv. Co.

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Linings (Rubber for Ball and Tube Mills)
B. F. Goodrich Rubber Co.
United States Rubber Co.

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Link-Belt Co.
Marion Steam Shovel Co.

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Jeffrey Mfg. Co.

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Lima Locomotive Works, Inc.

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Harrington & King Perforating Co.

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General Electric Co.

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American Manganese Steel Co.
The Frog, Switch & Mfg. Co.

Manganese Steel (Plates and Sheets)
Manganese Steel Forge Co.

Manganese Steel Parts
American Manganese Steel Co.
Manganese Steel Forge Co.

Mechanical Rubber Goods
B. F. Goodrich Rubber Co.
United States Rubber Co.

Mills, Grinding (Ball, Tube, etc.) (See also Crushers, Hammer)
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F. L. Smidth & Co.
Traylor Eng. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

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F. L. Smidth & Co.

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General Motors Truck Co.

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Fairbanks, Morse & Co.
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Binks Mfg. Co.
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Gulf Refining Co.

Packing
United States Rubber Co.
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B. F. Goodrich Rubber Co.
United States Rubber Co.

Pavers
Koehring Company, Div. of National Equip't. Corp.

Perforated Metal
Chicago Perforating Co.
Cross Engineering Co.
Harrington & King Perforating Co.
Hendrick Mfg. Co.
Morrow Mfg. Co.

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Hendrick Mfg. Co.

Portable Conveyors
Fuller Company
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Portable Crushing and Screening Unit
Pioneer Gravel Equip't. Mfg. Co.
Smith Engineering Works
Williams Patent Crusher & Pulv. Co.

Power Units
Fairbanks, Morse & Co.

Power Transmission Equipment
Chain Belt Co.
S K F Industries, Inc.

Pulverizers
Allis-Chalmers Mfg. Co.

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Ingersoll-Rand Co.
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Worthington Pump & Machy. Corp.

Pumps (Cement Slurry)
American Manganese Steel Co.
Morris Machine Works
F. L. Smidth & Co.
A. R. Wilfley & Sons

Pumps (Centrifugal)
Fairbanks, Morse & Co.
Ingersoll-Rand Co.
Morris Machine Works
A. R. Wilfley & Sons
Worthington Pump & Machy. Corp.

Pumps (Drainage)
Fairbanks, Morse & Co.
Worthington Pump & Machy. Corp.

Pumps (Dredging)
American Manganese Steel Co.

Pumps (Sand and Gravel)
American Manganese Steel Co.
Ingersoll-Rand Co.
Morris Machine Works
A. R. Wilfley & Sons

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Ready-Mixed Concrete Plants
Blaw-Knox Co.

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Koehring Company, Div. of National Equip't. Corp.
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Worthington Pump & Machy. Corp.

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Traylor Eng. & Mfg. Co.

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S K F Industries, Inc.
Timken Roller Bearing Co.

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Joseph T. Ryerson & Son, Inc.

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B. F. Goodrich Rubber Co.

Safety Equipment
Pulmosan Safety Equip't. Corp.

Sand Drag
Smith Engineering Works

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Sand Settling Tanks
Link-Belt Co.
Pioneer Gravel Equip't. Mfg. Co.

Scales (Automatic Proportioning)
Fairbanks, Morse & Co.
Richardson Scale Co.

Scales (Cement)
Fairbanks, Morse & Co.
Richardson Scale Co.

Scales (Railway Track and Truck)
Fairbanks, Morse & Co.

Scrapers (Power Drag)
Blaw-Knox Co.
Harnischfeger Corp.
Link-Belt Co.
Pioneer Gravel Equip't. Mfg. Co.

Sauerman Bros

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Bartlett, C. O., & Snow Co.
Chicago Perforating Co.
Cross Engineering Co.
Good Roads Machy. Corp.
Harrington & King Perf. Co.
Hendrick Mfg. Co.
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Jeffrey Mfg. Co.
Link-Belt Co.
Manganese Steel Forge Co.
Morrow Mfg. Co.
Pioneer Gravel Equip't. Mfg. Co.

Productive Equipment Corp.
John A. Roebling's Sons Co.
Simplicity Engineering Co.
Smith Engineering Works
Traylor Eng. & Mfg. Co.
Universal Vibrating Screen Co.

Screens, Scalping (Hercules and Standard)
Smith Engineering Works

Screens (Vibrating)
Jeffrey Mfg. Co.
Link-Belt Co.
Pioneer Gravel Equip't. Mfg. Co.

Productive Equipment Corp.
Simplicity Engineering Co.
Smith Engineering Works
Universal Vibrating Screen Co.
Williams Patent Crusher & Pulv. Co.

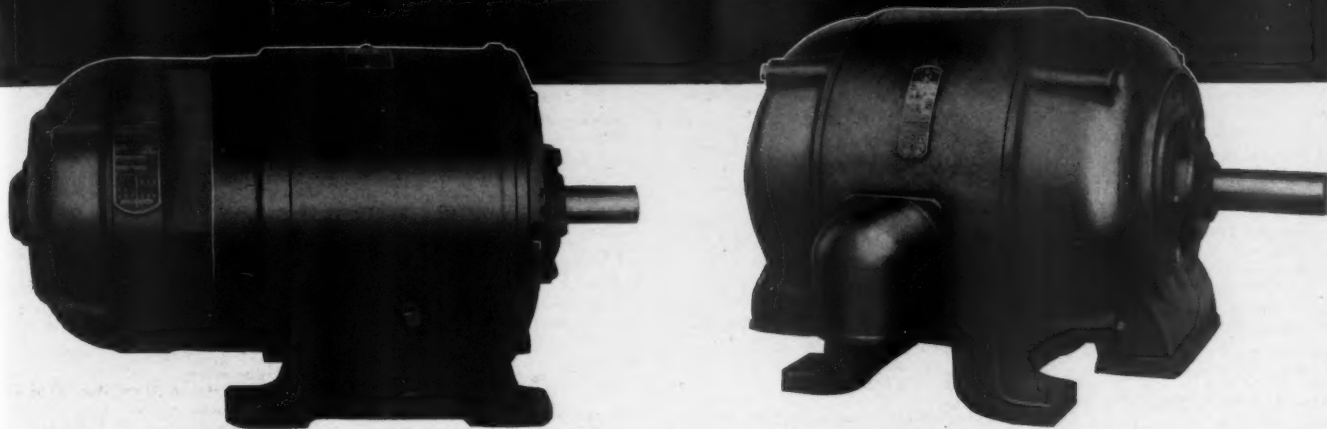
Screens, Washing (Hercules, Ajax and Standard)
Smith Engineering Works

Screw, Rewasher (Single and Twin)
Smith Engineering Works

Scrubbers
Lewistown Fdy. & Mach. Co.

TWO NEW MOTORS

...both mean
important savings!



Both of these new type motors mean an important saving in both first cost and operating costs in rock product service.

F-M GEAR MOTORS

The F-M Gear Motor consists of a horizontal motor combined in one unit with a suitable gear-reducing mechanism. The efficiency of the gear reducer is 97% or better. Ratios can be changed quickly and economically if need should arise.

For service where comparatively slow driving speeds are required, the use of the high priced, less efficient motor of the slow speed type is avoided. In addition to these advantages, jack-shafts and other speed reduction methods now out in the open and difficult to maintain, can be eliminated.

F-M SPLASH PROOF MOTORS

Knowing that the conventional open frame motor with protective housing and called "splash-proof", affords only a *degree* of protection, F-M engineers have built a motor designed from the very outset for maximum protection.

The unique features and thoroughness of protection afforded have enabled this motor to withstand severe operating conditions in types of service where previously nothing but a totally enclosed motor would suffice!

For rock products service, this motor on such installations means a saving in first cost and a saving in power consumption due to the greater efficiency as compared with the totally enclosed motor.

Send for
Informative
Bulletins

Complete descriptive bulletins on each of these motors on request by addressing Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill. 32 Branches at your service throughout the United States.

Pioneer
Designers
and
Manufacturers
of



FAIRBANKS-MORSE MOTORS

POWER PUMPING AND WEIGHING EQUIPMENT

104 Years

6091 EA 05.12

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For alphabetical index, see page 2

Seal Rings
Traylor Eng. & Mfg. Co.

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Joseph T. Ryerson & Son, Inc.

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Timken Roller Bearing Co.

Steel (Open Hearth)
Timken Roller Bearing Co.

Steel (Special Alloy)
Timken Roller Bearing Co.

Steel (Special Analysis)
Timken Roller Bearing Co.

Stokers
Combustion Engineering Corp.

Tanks
Combustion Engineering Corp.
Link-Belt Co.
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Texrope Belts (for Texrope Drives)
B. F. Goodrich Rubber Co.

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B. F. Goodrich Rubber Co.
United States Rubber Co.

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United States Rubber Co.

Tubing (Seamless Steel)
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United States Rubber Co.

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Combustion Engineering Corp.

Weighing Equipment
Fairbanks, Morse & Co.
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Weigh-Mix
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John A. Roebling's Sons Co.
Williamsport Wire Rope Co.

Wire Rope Slings (See Slings, Wire Rope)
Wire Rope Sockets (See Sockets, Wire Rope)



"GOOD ROADS" CHAMPION Reduction Crushers — Primary Crushers

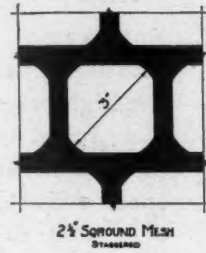
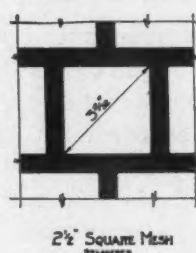
Elevating — Screening — Conveying and Washing
Equipment — Scrubbers — Road Oilers — Chip
Spreaders, etc.

The designing and installation of complete plants
for the production of Crushed Rock, Sand and
Gravel.

Good Roads Machinery Corp.
KENNETT SQUARE PENNSYLVANIA

NOW— HENDRICK "SQROUND" MESH (TRADE MARK)

Staggered Perforations



"Sqround" Mesh—the new Hendrick development—is
now available in staggered perforations.

"Sqround" Mesh, combining the good points of both
square and round perforations, gives accurate sizing.
The distance between filets in the corners of "Sqround"
Mesh is the same as the diameter of an equivalent
round opening. Thus, "Sqround" Mesh eliminates the
oversize which goes through the diagonal dimensions of
a square mesh.

"Sqround" Mesh is available in any size required, in
flat plate, in Hendrick Double Corrugated Plate, in
straight or in staggered perforations. Write for data.

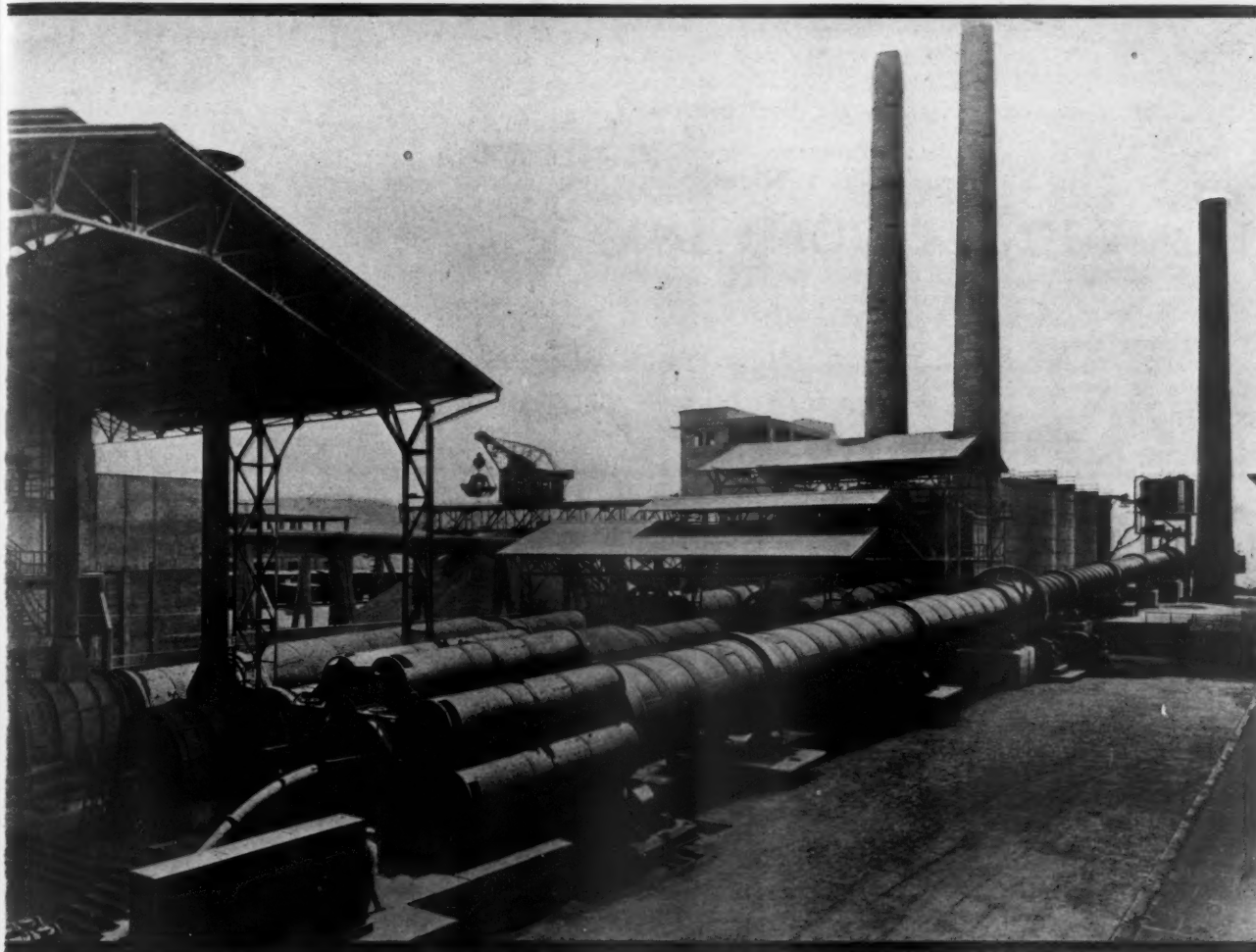
HENDRICK MFG. CO.

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Cincinnati Cleveland Detroit Hazelton
New York Philadelphia Pittsburgh

MODERN ROTARY KILNS

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WILL SAVE IN FUEL



THIS UNAX KILN IS 500' LONG

F. L. SMIDTH & CO.
ENGINEERS

225 BROADWAY

NEW YORK, N. Y.

Blaw-Knox DUST COLLECTORS

—save your valuable by-products

Are you throwing away those by-products which command premium prices—such as Asphalt Filler, Agricultural Limestone, Air Floated Fillers, and Rock Dusting Material?

Only those crushing plants equipped with a real DUST COLLECTING SYSTEM are in a position to reap these by-product profits.

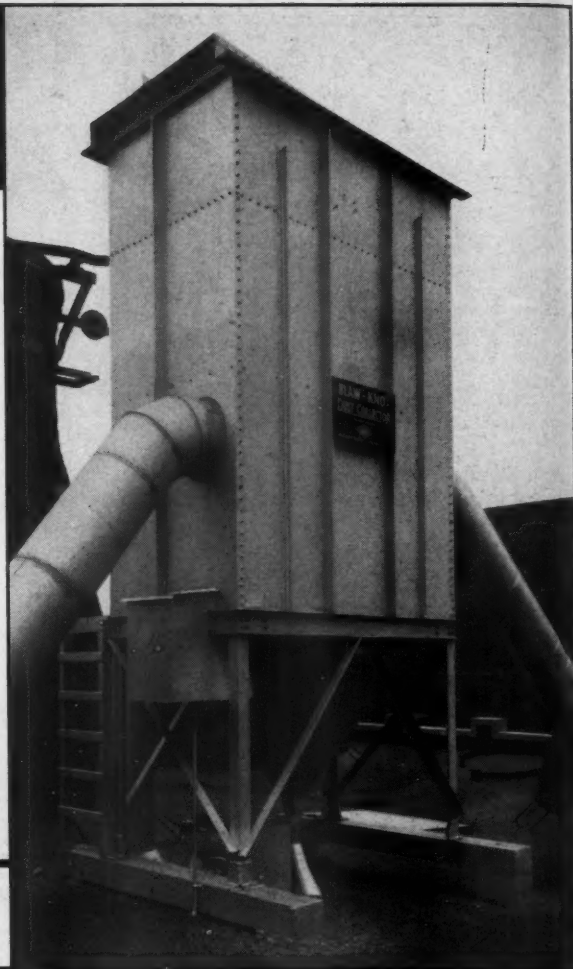
Let a Blaw-Knox Engineer show you how this can be done. An analysis will not obligate you.

BLAW-KNOX COMPANY

2035 Farmer's Bank Bldg.

Pittsburgh, Pa.

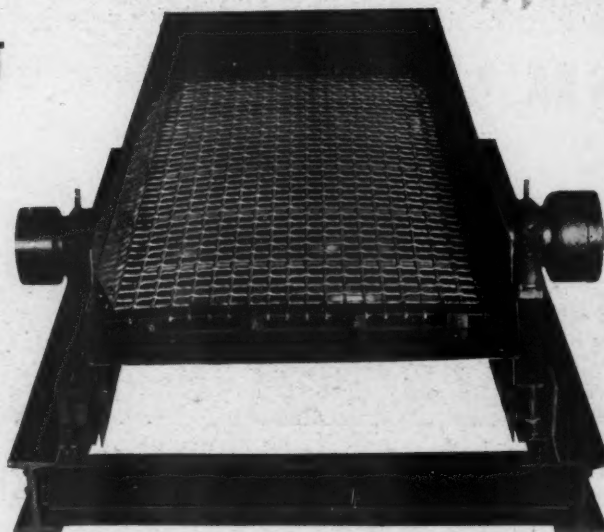
Offices in Principal Cities



BLAW-KNOX

Simplicity Gyrating Screens Lower Screening Costs . .

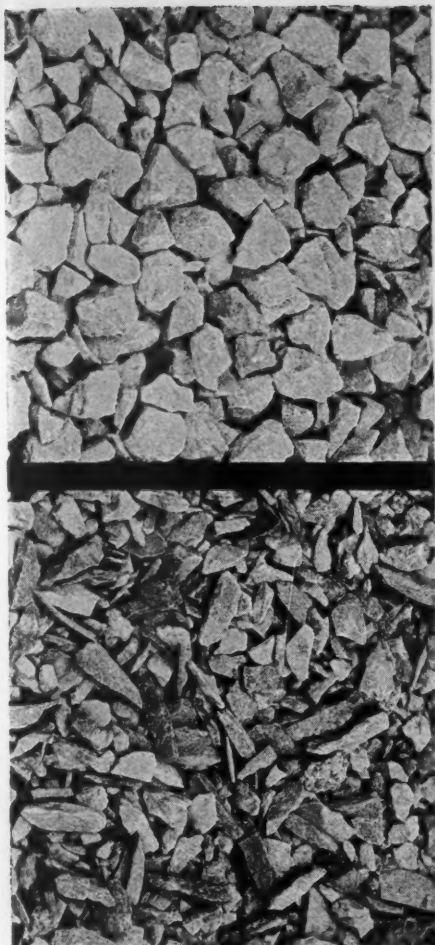
Based upon results during the past ten years, there is absolute certainty that the installation of a recommended SIMPLICITY Gyrating Screen will solve your screening problem at a low-tonnage cost. SIMPLICITY Screens with their large capacity, positive action, durable construction, perfect balance, no-blind feature and rubber cushioned power are decidedly superior screens as verified by the unusual screening records being made in many of the foremost plants in the industry. Write for descriptive literature. Our engineers are always at your service.



3' x 6' Single Deck Simplicity Gyrating Screen. Illustration shows screen arranged for flat belt drive.

SIMPLICITY ENGINEERING COMPANY
DURAND, MICHIGAN

For Canada: Watrous Limited, Brantford, Ontario



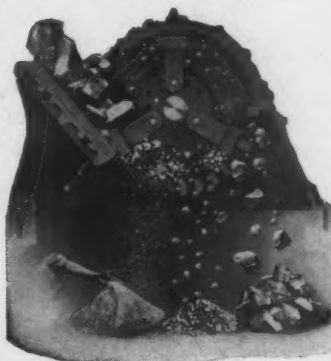
No Slivers from this recrusher

If you are getting "kicks" on slivers or slabby stone, your difficulties can be overcome with a Williams Hammer Crusher. The photos to the left tell the story. Both were made from the same rock, the only difference being in the type of crusher used. Note the approximately cubular shape of the product at the top made by a Williams, "not a sliver in a carload." The bottom sample was made with another widely used type of crusher. Established plants can install the Williams Jumbo Jr. type as a recrusher with very small investment. Available in six sizes, capacities 10 to 100 tons per hour. Crushes screen rejects or hand loaded rock. Larger sizes crush power shovel loaded stone to commercial sizes in one operation.

Williams Patent Crusher & Pulverizer Co.

800 St. Louis Ave. St. Louis, Mo.

Chicago New York San Francisco
37 W. Van Buren St. 15 Park Row 326 Rialto Bldg.



WILLIAMS
OLDEST AND LARGEST BUILDERS OF HAMMERMILLS IN THE WORLD
WILLIAMS
PATENT CRUSHERS GRINDERS SHREDDERS

SHAY GEARED LOCOMOTIVES

---Built for Quarry Service!



THERE'S no question about the adaptability of Shay Geared Locomotives to quarry service. They are built for it.

Shay Geared Locomotives are rugged. This fits them to withstand abuse and to give continuous, dependable operation under the most severe conditions.

Shay Geared Locomotives have great power. Their three-cylinder engines start heavy loads

quickly and pull them up hard-to-climb grades without difficulty or delay. Speedier car movement keeps quarry production at a maximum.

Because of these advantages . . . and others we will gladly tell you about . . . the Shay is the most reliable locomotive investment you can make. Write for catalog.

LIMA LOCOMOTIVE WORKS, Incorporated

Lima, Ohio

Sales Office: 60 E. 42nd St., New York, N. Y.

**"LOWER COST
THIS MONTH ED—
HOW COME?"**

FIELD



**"It's
This
DS-2
Sharpener"**

DESIGN

The bit is the business end of any rock drill. A shortage of sharp steel can slow down your operations and run up your costs.

Keep plenty of sharp steel at the working face. Make sure that your bits are there when needed by using the Gardner-Denver DS-2 Sharpener.

The DS-2 is ideal for quarry use—sturdy and dependable, yet light in weight and easy to move. It forms keen cutting edges on hexagon, quarter octagon, or round steel up to and including 1 1/4 inch.

You'll find these exclusive Gardner-Denver features in the DS-2—tandem clamping pistons, valveless dolly hammer cylinder, rapid forging action, and an effective scale blower.

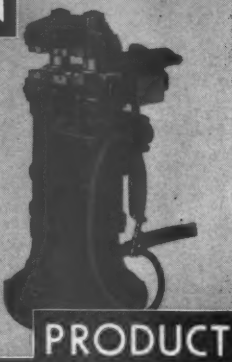
For better drilling results, get the complete facts about this sharpener. Write us for Bulletin DSE-2.

GARDNER-DENVER CO., 101 Williamson St., Quincy, Ill.

Horizontal, Vertical, Air-Cooled and Portable Compressors • Steam and Power Pumps
Rock Drills, Accessories • Paving Breakers • Clay Diggers • Hoists

GARDNER-DENVER

MAKES AIR DO MORE AND COST LESS

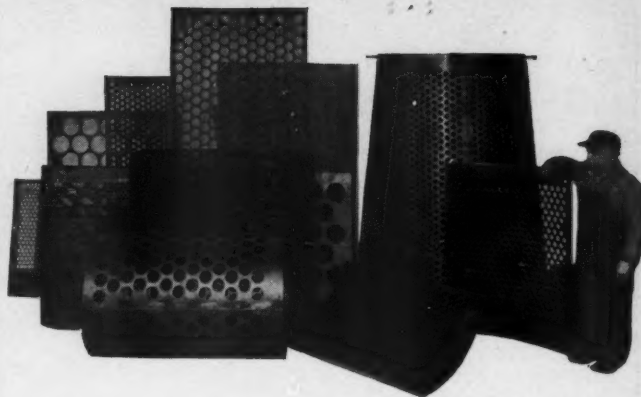


PRODUCT



SCREENS

of Perforated Metal



For Sand, Gravel, Stone and Ore. Perforations of all standard types, also of unusual sizes and layouts to give large production and reduced screening costs.

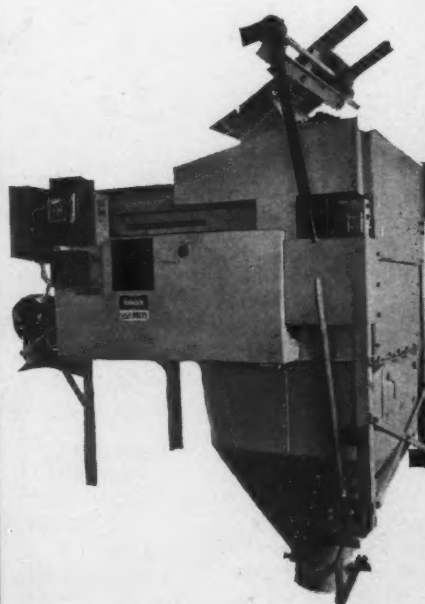
The Harrington & King
PERFORATING CO.

5650 Fillmore St., Chicago, Ill. 114 Liberty St., New York, N. Y.

LOAD BULK CEMENT

Quickly, Accurately and Without
Trimming or Re-weighing, with the

Richardson Automatic Cement Scale



By weighing cement automatically, the right amount is placed in the car—there are no over-weights to take out, or extras to put in and no re-weighing necessary.

Used by all leading mills for loading cars, barges and trucks.

RICHARDSON SCALE COMPANY
Clifton, New Jersey

Premixed Materials For Stabilized Roads

A New Market For Pits and Quarries

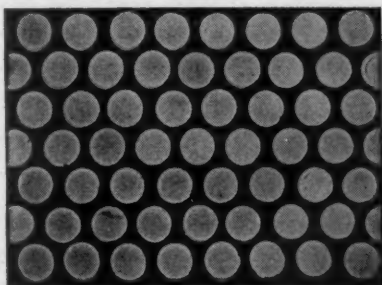
An experiment was made at Lodi, Ohio, wherein crushed gravel, sand and clay were mixed in the proper proportions—right at the pit—and delivered to a nearby road. No extra work was then needed except evening up the materials on the road and the spreading of Columbia Calcium Chloride over the surface to keep it moist, compact and dustless.

Since considerable quarry or pit waste can be used, this Stabilized Road Market presents big possibilities to the owners of pits and quarries. Write us if you are interested in further details.

The Columbia Alkali Corporation

Barberton, Ohio

MORROW SCREEN PLATES



MORROW PERFORATED METAL SCREEN PLATES for sizing and preparing coal, sand, gravel, stone and other bulk materials are made by a Company specializing in screening machinery.

A complete set of punches and dies covering a wide range of sizes, in round, square, oval and diagonal slots are ready for the press, insuring prompt delivery of orders.

*Prices are right.
Send for Bulletin 57.*

The Morrow Manufacturing Co.
Wellston, Ohio



FLEXCO

HD

BELT
FASTENERS
for
ELEVATORS
and
CONVEYORS

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NON-CLOG HAMMER MILL

This powerful brute gives you *REAL CAPACITY*. It tackles the toughest reduction problems whether in cement plant or quarry, and goes through day after day without clogging, balking or breakdown.

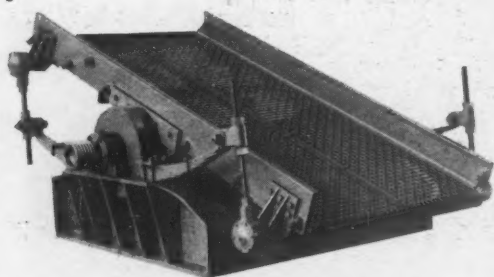
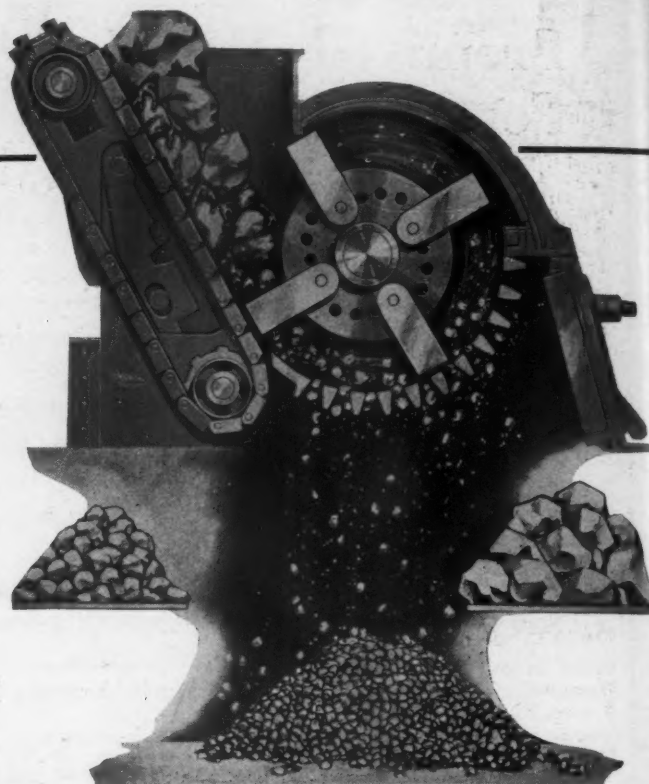
Look at that *SPECIAL MOVING BREAKER PLATE*. It has 26 times average wearing area. Think of the increased life this gives this remarkable crusher.

—And you can have a DIXIE Crusher in any one of 40 sizes—in any capacity—Primary—Secondary or Fine Reduction.



Ask for the latest crushing facts as they apply to 1934 requirements!

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HEAVIDUTY SCREENS

differ from the thousand and one varieties on the market in that they are exceptionally rugged. You'll appreciate the long life that has been built into them.

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make resales as often as we might if we made Huron Screens less sturdy. But our patronage is constant. We know that when a HURON Heav-duty Screen finally wears out it will be replaced with another HURON by a well-satisfied customer.

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810 OUTSIDE ROOMS
Each with tub and shower bath

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A few at \$2.50 and up
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IMPROVED
KRITZER
Continuous
LIME
HYDRATOR

The KRITZER "Big-Boy"

HYDRATED LIME—10 Tons an Hour—and Better

THE KRITZER COMPANY'S ANSWER TO THE NEW DEAL

MORE HYDRATE PER SHIFT!

The same high quality of Hydrate—the same rugged, uninterrupted production that has made

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Spiral Screw and Log Washers, De-Waterers and Shale Removers, Flume Classifiers, Swintek Ladder Suction Screen Nozzles, Chain Type Cutters, Barges and Pontoons, A Frame and Gantry Hardware, Vibrating and Revolving Screens, Steel Dump Cars, Grizzlies, Car Wheels and Trucks, Steel Bins, Water Tanks, Structural Towers, and Dry Pans.

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Perforated plate is a solid one-piece product which cannot set up wear within itself and lasts until the material has worn it out.

A CROSS Vibrating Screen Plate, besides that, is made of specially selected or alloy steel; punched by men who know their business, and with punches and dies scientifically adapted to every perforation, thickness, and character of material.

The result is longer wear, lower cost per ton, greater capacity, and less replacement labor.

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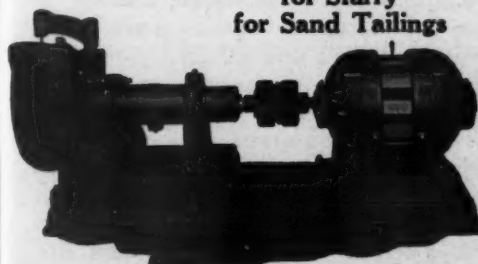
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for Slurry
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ELIMINATION of stuffing box has done away with many troubles common to centrifugal pumps.

Pump maintains extraordinary efficiency.

Pumping parts unusually heavy, insuring long life. Cleaning out pump or changing wearing parts requires only a few minutes.

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**PRODUCE HIGH STRENGTH
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CEMENTS
by the new process!**

*Inquiries invited from producers of
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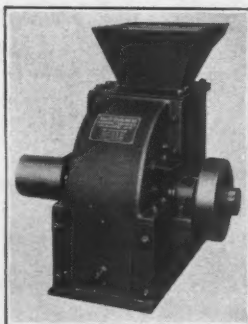
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**Perforated Metals — Screens of
All Kinds — For Sand, Gravel,
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PROMPT SHIPMENT

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The Allis-Chalmers Pulverator is an impact crusher used for pulverizing friable non-siliceous materials. It is built in four sizes with from 4 to 24 hammers.

Write for Bulletin 1467.

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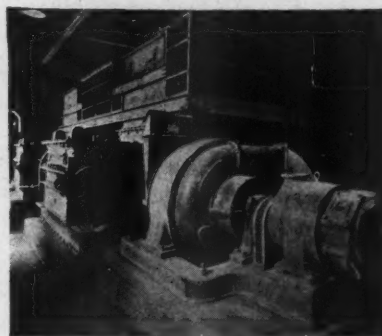
ROLMAN Manganese Steel SCREENS

The patented Double Lock Mesh feature maintains an absolute accuracy of separation during entire life of the ROLMAN SCREEN.

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"PENNSYLVANIA" STEELBUILT HAMMERMILLS



installed in the largest Cement Plant in the British Empire. Five other plants of the same Company are "Pennsylvania" equipped.

PENN-PRIMARY Hammermills, PENN-LE-HIGH PRIMARY ROLLS, PENNSYLVANIA - BUCHANAN Jaw Crushers, "PENNSYLVANIA" Secondary and Fine Reduction Hammermills meet every raw side-crushing need.

Unbreakable Steel Construction
Positive Tramp Iron Protection

**PENNSYLVANIA
CRUSHING COMPANY**
Liberty Trust Bldg.
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Put Your Reduction Problems Up to Us New York Pittsburgh Chicago

MANGANESE STEEL CASTINGS

for the

Rock Products Industry

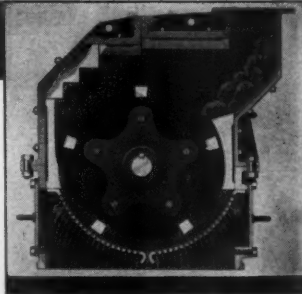
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Known For Its Superior Shock
and Wear Resisting Qualities.

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Established 1881 Carlisle, Pa.

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● Cyclo Crusher Pulverizers are inexpensive. They are equipped with Timken Bearings, manganese steel hammers, fly wheel, cast steel breaker blocks and are completely lined with hard iron wearing plates. Capacities 1 to 25 tons per hour when crushing to 10 mesh or finer.

- ROTARY SCREENS
- DRYERS
- SKIP HOISTS
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- CONVEYORS

THE C. O. BARTLETT & SNOW CO.
6194 HARVARD AVENUE CLEVELAND, OHIO

THE editorial library of Rock Products contains practically every obtainable treatise relating to the production of stone, sand, silica, phosphate rock, gypsum and other non-metallic minerals and on the manufacture of cement, lime, gypsum products, etc. The editors are technical men and are familiar with these books. Our library of manufacturers' literature is as complete and up-to-date as possible. Rock Products welcomes inquiries, and our facilities are ever at the disposal of our subscribers and advertisers.

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EFFICIENT & ECONOMICAL SAND AND GRAVEL WASHING



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CENTRIFUGAL PUMPS

For hydraulic dredging, filling, sand and gravel production, hydraulic conveying of slurry and other liquids containing abrasive materials, clear water pumps for general service. Also complete dredges with all accessory equipment. Dredging pump designs include heavy-duty types and special alloy parts for severe service. Types and sizes for the largest or smallest operations, and belt, motor, steam, oil or gasoline-engine drive.



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CRUSHERS
SIZES 10"x7" to 72"x34"

Complete Plants Designed and Equipped.
Screens, Elevators, Conveyors, Quarry,
Sand and Gravel Plant Equipment.
Engineering Service.

EARLE C. BACON, Inc.
17 JOHN STREET NEW YORK, N. Y.

Why ship dirty
stone when it can
be made clean easily
and economically?



SCRUBBER
This scrubber will do the good work.
State Capacity Required!

LEWISTOWN FOUNDRY & MACHINE CO.
Mfrs. of Sand Crushing, Grinding, Washing
and Drying Machinery
LEWISTOWN - - - - PENNA.

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Single, Double Roll Crushers—Super Dry Pans—Steel Log Washers and Scrubbers—Dryers—Jigs—Screens—Holsts, Elevators and Conveyors—Reciprocating Feeders, Dingates, Chutes, Turn Tables, Elevator Buckets, Car Pullers, Rail Straighteners, Cast Parts, Rough or Finished—Car Wheels and Brake Shoes, Sprockets and Sheaves, Gears and Bearings, Gratings and Columns, Chute Linings, Grate Bars of Special Heat-Resisting Metals.

Write for catalogues listed or for information concerning any of the material, machinery and castings listed, required in mine, quarry or pit.

McLANAHAN & STONE CORPORATION
Manufacturers—Founders—Machinists
Hollidaysburg (Established 1835) Pennsylvania

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Used Equipment For Sale

CRUSHER FOR SALE
One 9"x21" Telsmith Roller Bearing Jaw Crusher with feed bin and 15 H.P. General Electric Motor, V belt drive. All in good condition.

ERIE SAND & GRAVEL CO.
ERIE, PENNA.

FOR SALE—Repossessed screen, revolving type, never in service, 48" diameter x 18' long, with scrubber section, 3/4" perforated plate, with 10-gauge wire sand jacket. Drive at discharge end. Screen mounted on fabricated steel base. Covered by new guarantee. Will name special price for immediate sale. The Columbus Conveyor Company, Columbus, Ohio.

Marion Gas Electric 3/4-Yard Shovel.
1-Yd. Osgood Crawler Shovel, rebuilt.
Side and Center dump cars.
Locomotives—75-ton Switcher, code boiler
—saddle tank type, 18 to 65 tons.
Cranes and Draglines, various sizes.

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Used Equipment For Sale

PRACTICALLY NEW SURPLUS EQUIPMENT

Crushers:

- 1—42x60 Farrell Jaw Crusher, Electric Motor and Texrope drive.
- 1—36x24 Farrell Jaw Crusher, Gasoline Motor and Texrope drive, new 1932.
- 1—10x36 Farrell Jaw Crusher.
- 1—Model No. 840, Bakstad, 3-jaw Reduction Crusher, 10 tons per hour, new 1930.

Compressors:

- 1—20x12x14 Chicago-Pneumatic, O.C.E. Elec., 1300 cu.ft., after cooler and Air Receiver, A.C.
- 2—Ingersoll-Rand, Type XRB, Electric 500 cu. ft. each, 110 HP Motor, A.C.

Conveyors:

- 1—Barber-Greene Belt Conveyor, 105 ft. centers, 24" wide.
- 1—Barber-Greene Belt Conveyor, 235 ft. centers, 24" wide.
- 1—Robins Belt Conveyor, 250 ft. centers, 36" wide.
- 1—Robins Belt Conveyor, 150 ft. centers, 24" wide.

Well Drills:

- 2—Sanderson Cyclone 8" Well Drills, Model SR. No. 14, Electric A.C.

Electric Loaders:

- 4—Barber-Greene Electric Loaders, A.C.

GEO. M. BREWSTER & SON, INC.

Contractors

Bogota, New Jersey

Asphalt Plant:

- 1—Cummer Asphalt Plant, hot or cold materials, 3000 sq.yd.cap., 1-ton Mixer; Bins, 2 dryers, 6-25,000 gal. tanks, fluxing kettles, elevators, motors, drives and steel building.

Electric Shovel:

- 1—Marion No. 490 Electric Crawler Shovel, No. 6532, New 1931, 2½-yd. Mang. Rock Dipper; Ward-Leonard Control, 440-volt, A.C.; New extra boom and misc. parts.

Locomotive Crane:

- 1—30-ton, 8-wheel, Browning, Model 3-C, steam, coal or oil-burning, 60" code boiler, 50 ft. boom, bucket operating, M.C.B. trucks, like new.

Dragline Scrapers:

- 1—4-yd. Sauerman, complete with 150 H.P. Clyde Elec. Hoist, 440-volt, A.C.
- 1—2-yd. Sauerman, complete with 75 H.P. Clyde Elec. Hoist, 440-volt, A.C.

Delco Lighting Plants:

- 3—Delco Lighting Plants, 1500 watt generators, 4-cyl. gasoline motors; 56 ironclad batteries each; like new.

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MARION STEAM SHOVEL—Model 36, (Revolving), 24-ft. boom, 1½ cu. yard, mounted on railway wheels.

LOCOMOTIVE CRANE, Brownhoist, Elevated Pedestal Type, Pedestal height 11 ft. 2 inches, Boom length 48 ft. 3 inches, equipped with bucket.

CAMERON CENTRIFUGAL PUMPS — Three No. 10, double suction Volute, 2,000 gallon per minute, Motor driven, D.C. 230 volt, connected to 100 H.P. Reliance motor, 1,100 R.P.M., switch-board included.

RIDGWAY GENERATOR SETS — Two 200 K.W., 200 R.P.M., 240/250 volt D.C. generators direct connected to Ridgway 18x22 Corliss four-valve engines, switch-board included.

LOCOMOTIVES — One 65-ton, 6-wheel; One 40-ton, 4-wheel, H. K. Porter Saddle tank locomotives, Standard gauge.

CRUSHING MACHINE—Two Sturtevant Mill Co. sampling machines for Laboratory use; One Roll Jaw-Type for coarse grinding; one for fine grinding.

Address Box 621, care of Rock Products, 330 South Wells Street, Chicago, Illinois.

1—13-A Telamith Gyrtatory Crusher.

1—P & H Model 600 Shovel 1 yd.

1—¼ Yd. General Shovel-Crane.

1—¼ Yd. Osgood Gas Shovel.

2—2 Yd. Marion 480 Steam Shovels.

6—20 Yd. Koppel Air Dump cars.

16—6 Yd. Koppel Dump cars.

33—4 Yd. Heavy Steel Stone skips.

12—2 Yd. Steel Stone skips.

18—1½ Yd. 24 and 36" Ga. cars.

1—30" Conveyor 100 ft.

Loco. type boilers: 60, 80, 100 H.P.

Compressors: 610, 1000, 1300 Ft.

Gas Locomotives: 8, 16, 20 ton.

Dryers, Ball Mills, Screens, Conveyors, Loco.

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Jaw Crushers 10x18, 15x36, 18x30.

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FOR SALE—SEASONABLE ITEMS

2 Bucyrus 100B 3-yd. cat. mtd. steam shovels.

3 Bucyrus 50B—1¼-yd. cat. mtd. Diesels.

100 Western 5-yd. 36" ga. hvy. duty dumps.

50 Western 30- and 12-yd. S/G hand and air.

1 Brown loco. crane 25-ton D/D R.R. type.

1 stone plant 18" gyr. no real estate.

1 aerial tramway 2,800 ft. American.

1 Ottumwa mine hoist 4,000' electric.

A. V. KONSBERG, 111 W. Jackson Blvd., Chicago

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ROCK PRODUCTS is the business journal of the rock products industry; its readers are men of influence, and their buying power is big. An advertisement in this classified department will be seen and read. Make your wants known and see how quickly they will be satisfied.

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- 1—32 Marion Steam Cats., 1½ Yd.
- 175-B Bucyrus Steam 4-wheel trucks.
- 100-B Bucyrus Erie Electric Cat., 3 Yd.
- 2—Jordan Std. Ga. Air Spreaders.
- 19—K&J 16-Yd. Std. Ga. Air Dump Cars.
- 20—Koppel Std. Ga. Air Dump Cars.
- 1—Std. Ga. Nordberg Track Shifter.
- 2—36" Ga. Porter Steam Locos.
- 6—4-Yd. 36" Ga. Western Dump Cars.
- 19—Easton 4-Yd. 48" Ga. All Steel End Dump Quarry Cars.
- 1—5-Ton 48" Ga. Plymouth Gas Loco.
- 1—8-Ton Std. Ga. Plymouth Gas Loco.
- 1—60 Caterpillar Tractor.
- 1—3-Yd. Athey Crawler Wagon.
- 4—1¼-Yd. Maney Scrapers.
- 2—28S Koehring Mixers.
- 1—27E Ransome Paver.
- 1—8' Riddell Grader Cats., Deering Power.
- 1—12' Gallon Leaning Wheel Grader.
- 1—12' Super-Mogul (Russell) Grader.
- 1—856' Sullivan Angle-Cpd., Compressor with 152 HP, 3 PH, 60 Cy., 220 V Motor.

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THE T. J. LANE CO.,

Box 458 Springfield, Ohio

STEAM LOCOMOTIVES CODE BOILERS

- 64-ton Porter 6-wheel saddle tank.
- 50-ton American 4-wheel saddle tank.
- 40-ton American 4-wheel saddle tank. (2 duplicates.)
- 36-ton Porter 4-wheel saddle tank. (2 duplicates.)
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- 21-ton Vulcan 4-wheel saddle tank, 36" gauge. (8 duplicates.)
- 21-ton Porter 4-wheel saddle tank, 36" gauge. (2 duplicates.)

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Link-Belt crane-dragline K 44; No. 1769; new 1932; moved 200,000 yards; 1¼ yard dragline bucket; 50 ft. boom. Condition excellent.

Address Box 617, care of Rock Products, 330 South Wells Street, Chicago, Illinois.

CONSOLIDATED offers GOOD USED CRUSHING, PULVERIZING, DRYING AND FILTERING EQUIPMENT—COMPLETE

Crushing Plants; Diesel, Gasoline, Electric Cranes and Shovels; Hoists; Compressors; Pumps; Draglines and Excavating Equipment; and all sizes and types of Jaw, Gyrtatory and Roll Crushers; Swing Hammer Mills; Elevators; Belt Conveyors; Rotary and Vibrating Screens; Rotary Kilns and Dryers; Raymond and other fine Pulverizers; Air Separators; Hardinge Ball and Pebble Mills; Siler and iron lined Tub Mills, etc. Send for Bulletin No. 14.

CONSOLIDATED PRODUCTS CO., Inc., 15-16-17 Park Row, New York City
Tel. Barclay 7-0600
Shops and Yards at Newark, N. J., now covers eight acres

CLASSIFIED ADVERTISEMENTS

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WANTED

Good used equipment for crushing plant including 3' or 4' Symons Cone Crusher; Vibrating Screens; 24" and 36" Belt Conveyors; Diesel Power Plant about 200 HP; 1½ or 2 yd. Crawler Shovel; Bins, Scales, etc. Address Box 622, care of Rock Products, 330 So. Wells St., Chicago, Ill.

WANTED

Sand and Gravel Bins with weighing batchers, 125 to 200 ton capacity.
Central Sand & Gravel Co.,
Memphis, Tenn.

BUSINESS OPPORTUNITIES

COURT SALE OF PROPERTIES of CONSUMERS MATERIAL CORPORATION (Kansas City, Missouri)

A public sale at auction (without warranty or representations of any sort) of the properties of Consumers Material Corporation of Kansas City, Missouri, in receivership, is to be held June 22, 1934, at the County Court House in Independence, Missouri. The sale will be held pursuant to decree of the United States District Court at Kansas City entered May 19, 1934.

The Company has been engaged in the general crushed stone business, its main properties having been since January, 1930, actively operated by Stewart Sand and Material Company under a lease arrangement. The properties in general consist of:

A well equipped plant in active operation for tunnel mining, crushing, screening and loading of rock products including appropriate machinery, equipment and facilities, located on a branch of the Missouri Pacific Railway one-half mile east of Independence, Jackson County, Missouri, together with approximately 53 acres of land largely undrained and certain recently acquired rock deposits in adjoining lands.

A plant adequately equipped but not now in operation at Birmingham, Clay County, Missouri, located on or near the rights of way of the C. M. St. P. & P., Burlington, Wabash and Rock Island Railways, together with approximately 60 acres of leasehold land with rock mining rights.

A plant partly dismantled and not now in operation at McDowell Station near Smithville, Clay County, Missouri, with approximately 35 acres of land.

A plant largely dismantled and not now in operation near Gallatin in Daviess County, Missouri, with approximately 44 acres of land.

An assortment of machinery and equipment, including especially numerous motors.

The properties will be offered in parcel lots and groups and as a whole. A detailed description of the properties together with the terms of sale may be had on application to the Special Master, Albert L. Reeves, Jr., 906 Commerce Building, Kansas City, Missouri, or may be had by referring to the official notice of the sale being published in "The Examiner" of Independence, Missouri, in its issues of May 24, May 31, June 7, and June 14, 1934. Inspection of the properties may be had by arrangement with the Special Master or with the President of Stewart Sand and Material Company in Kansas City, Missouri.

Albert L. Reeves, Jr.,
Special Master.

BUSINESS OPPORTUNITIES

COMPLETE ROCK CRUSHING PLANT FOR SALE

AT A BARGAIN

The entire equipment and quarry lease of the Jacksboro Stone Products Co., of Jacksboro, Texas, can be purchased at a bargain. Address The First National Bank of Jacksboro, Texas.

FOR SALE—Large lime and fine chemical plant. This is not a "dead cat" proposition, but a very much alive and going concern. Owner is in declining years and very poor health. Don't answer unless you have the proper financial backing and mean business. Address Box 620, care of Rock Products, 330 South Wells Street, Chicago, Illinois.

FOR SALE

Slag business located in Eastern Pennsylvania. Owner wishes to retire from business. Details furnished upon request. Address Box 619, care of Rock Products, 330 South Wells St., Chicago, Illinois.

FOR SALE

Lime plant and property in Ste. Genevieve County, Missouri, with R. R. switch and Mississippi River loading facilities and equipment. Ideal plant for high calcium chemical lime.

B. E. ROMBAUER, Brickey's, Mo.

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GENERAL CEMENT PLANT OPERATOR—

Qualified to assume full charge of any size plant. 18 years' actual experience as assistant chief chemist, quarry, mill, kiln, packing, maintenance, and construction foreman. 8 years full charge of all plant operations, maintenance and control of 8,000-barrel plant. Location and position to start immediate. Address Box 603, care of Rock Products, 330 South Wells Street, Chicago, Ill.

SALES AND PROMOTIONAL MAN DESIRES permanent connection with a progressive lime manufacturer. 15 years' experience. Well and favorably known among the dealers, contractors and chemical trade in Chicago and Central Illinois. Excellent references as to character and ability. Address Box 555, care of Rock Products, 330 South Wells Street, Chicago, Illinois.

CHIEF CHEMIST WITH A RECORD FOR honesty and high quality product desires position of responsibility. 18 years' experience in the cement industry. Capable of directing research as well as laboratory control of plant. Has had extensive operating experience. Familiar with all recent theories and practices. References. Address Box 623, care of Rock Products, 330 South Wells Street, Chicago, Ill.

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35 Doane Street, Boston, Massachusetts.
Specializing in Gypsum Plants and in the Mining, Quarrying and Manufacture of Gypsum Products.
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By using Diamond Core Drills. We drill for Limestone, Gypsum, Talc, Fire Clay, Coal and all other minerals.
PENNSYLVANIA DRILLING CO.
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DIAMOND CORE DRILLING

CONTRACTORS

FIRECLAY, ASPHALT, LIMESTONE,
COAL AND ALL MINERALS
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Try cloverine fertilizer all crops

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Consulting expert on phosphate matters. Correspondence solicited. Will advise as to use of and furnish all brands and grades of phosphates.

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CEMENT CHEMIST DESIRES CONNECTION with progressive concern. Employed at present by large western company. 6 years' experience in plant operation. Capable of handling any problem concerning cement production. Extensive experience with cement research, including all special cements. Address Box 618, care of Rock Products, 330 South Wells St., Chicago, Ill.

QUARRY SUPERINTENDENT DESIRES A permanent connection. 18 years' experience in operating trap rock, limestone quarries and crushing plants; also familiar with lime kilns and construction work. Excellent references. Address Box 449, care of Rock Products, 330 So. Wells Street, Chicago, Illinois.

POSITIONS VACANT

FOREMAN WANTED FOR QUARRY—Must be aggressive. Write stating age, experience, references. Address Confidential, % Rock Products, 330 South Wells St., Chicago, Ill.

LIMA "CATERPILLAR" DIESELS

SHOVELS
DRAGLINES
BACKDIGGERS
CRANES



**SAVE
60%-80%
in
FUEL COSTS**



**INCREASE
PRODUCTION**

Fuel Costs Reduced, Production Increased with LIMA "Caterpillar" Diesel Shovels, Draglines and Cranes

THE application of "Caterpillar" Diesel power to LIMA shovels, draglines and cranes brings to the user of excavating machinery a new conception of fuel economy. LIMA "Caterpillar" Diesel machines operate on inexpensive fuel, consequently fuel costs are 60% to 80% lower as compared with gasoline powered machines. This desirable feature plus the profitable advantages of roller bearings at every vital bearing point, helical gears throughout (two exclusive LIMA features), and the unusual lugging ability of the Diesel engine, result in a type of construction that will produce much greater yardage at less cost.

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DIVISION OF LIMA LOCOMOTIVE WORKS, INCORPORATED
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